TASCAM
TEAC Production Products

M-512/M-520

Mixing Consoles

M-512

OPERATION/MAINTENANCE

5700055500

M-520

CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN	CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
⚡	The lightning flash with arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.
⚠	The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

The guarantee of performance that we provide for the M-512 and M-520 must have several restrictions. We say that the console will perform properly only if it is adjusted properly and the guarantee is that such adjustment will be possible. However, we cannot guarantee your skill in adjustment or your technical comprehension of this manual. Therefore, setup is not covered by the Warranty. If your attempts at internal adjustment are unsuccessful, we must make a service charge to correct your mistakes.

Recording is an art as well as a science. A successful recording is often judged primarily on the quality of sound as art, and we obviously cannot guarantee that. A company that makes paint and brushes for artists cannot say that the paintings made with their products will be well received critically. The art is the province of the artist. TASCAM can make no guarantee that the console in itself will assure the quality of the recordings you make.

Your skill as a technician and your abilities as an artist will be significant factors in the results you achieve.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

This apparatus has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.

Model number ______________________

Serial number ______________________

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puts 17
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ack 18
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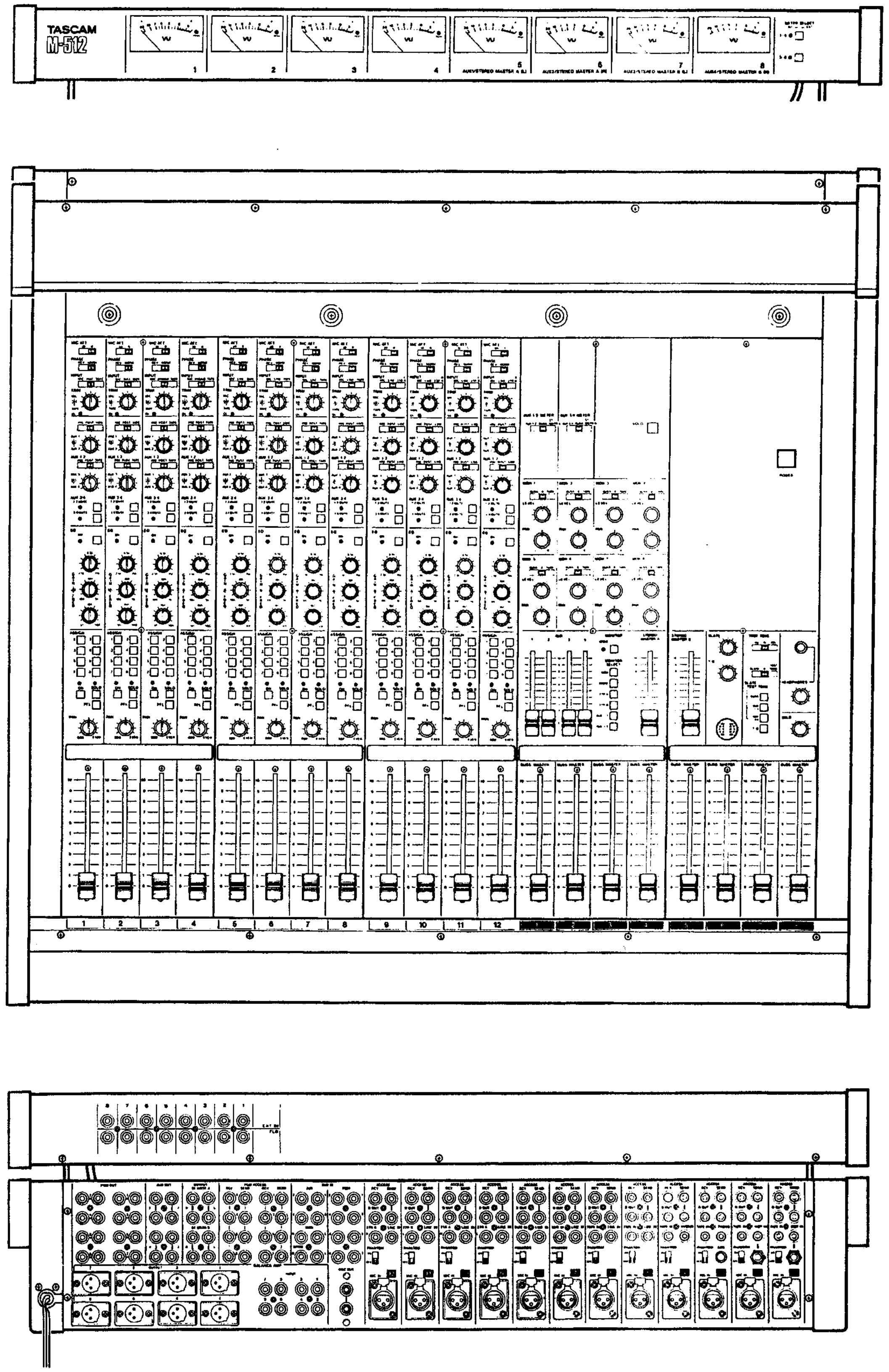
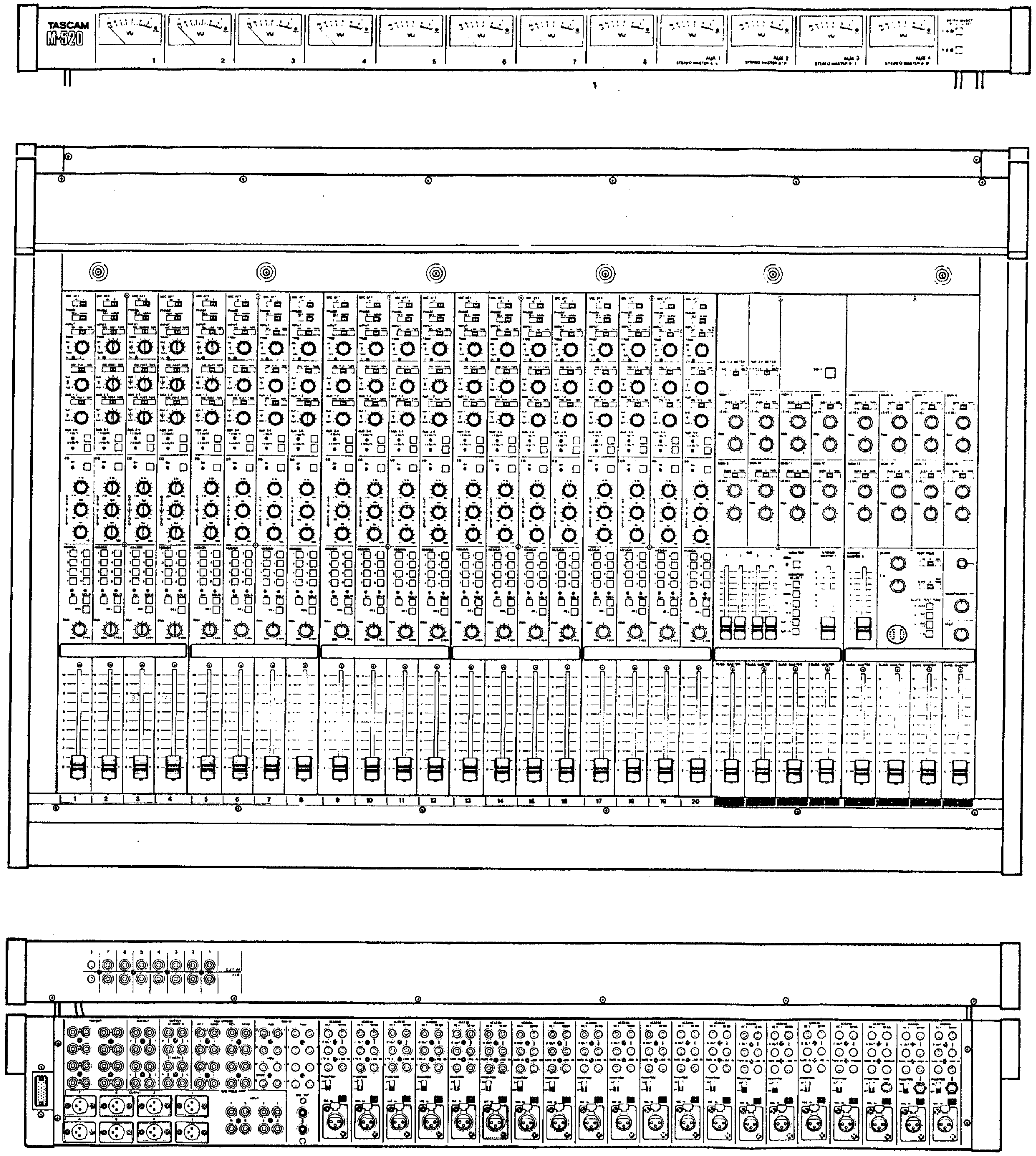
M-512



M-520



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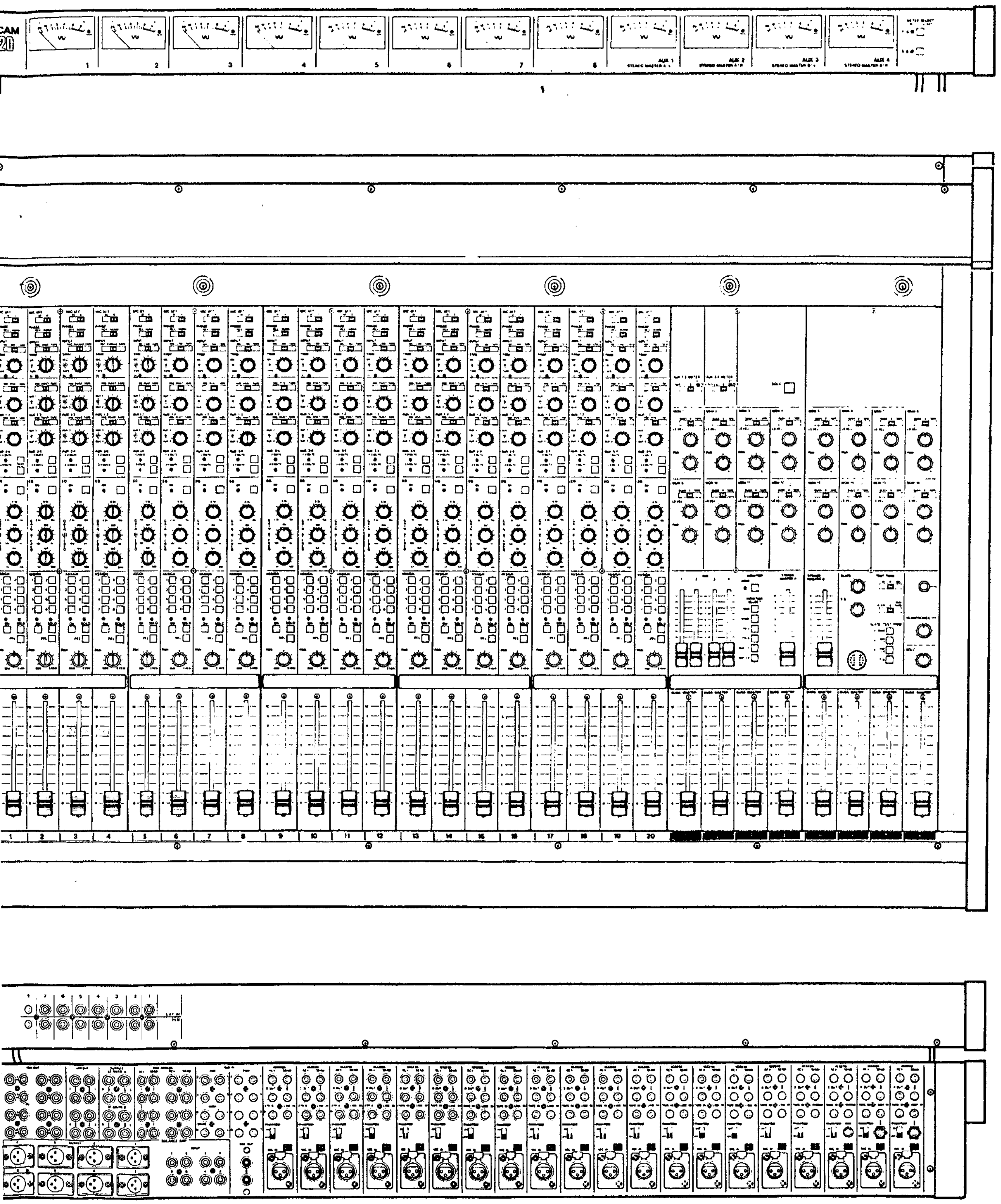


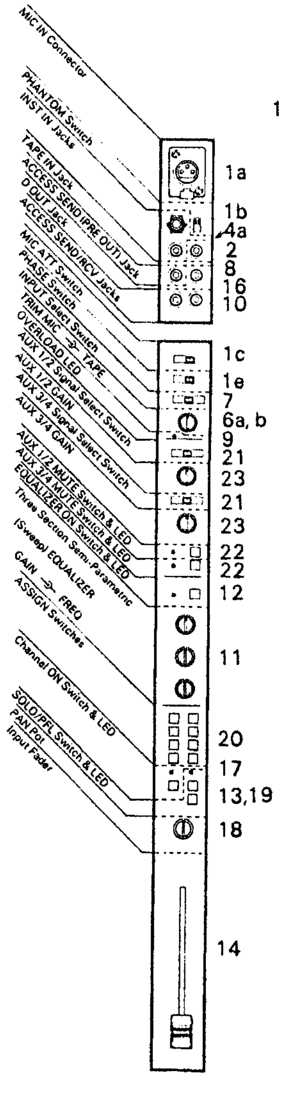
INTRODUCTION TO THE MANUAL, AND HOW TO USE IT

The M-512 and M-520 Mixing Consoles have been designed to satisfy the requirements of the modern multichannel recording process. The two consoles are similar in design and operation; their input channels and output sections are virtually identical, as are the connectors and levels. Both consoles have 8 primary mixing busses. The major difference is that the M-512 has 12 input channels and an 8 track monitor section, whereas the M-520 has 20 input channels and a 16 track monitor section. Either console may be used to record 4, 8 or 16 track tapes; the M-520, however, is required for convenient mixdown of 16 track tapes. In addition to the 8 or 16 track switchable (BUSS/TAPE) monitor sections, these consoles have four built-in auxiliary systems. These *Submix* sections, AUX 1, 2 and 3, 4, can be assigned and rerouted to do more than one task. They can be used to create 4 monaural mixes, two stereo mixes, or one stereo and two mono mixes for cueing, effects, remote broadcast feeds, and so forth. Complete and convenient multitrack operation usually can be accomplished directly from the top panel, without re-patching.

However, the process of multitrack recording is constantly changing, growing more complex as an art with each advance of technology. No matter how many inputs, outputs and special functions that we provide, no console can ever be built so large that it will be capable of coping with all of the switching and routing problems with a "one button" top panel solution. Someone will always be able to come up with that unique situation requiring *just one more submix.*

The design of the console recognizes the fact that your signal processing needs may require a unique arrangement of subsystems. In order to cope with these changing needs, patch points are provided throughout all signal pathways of the console. As our mixing console becomes more flexible, the amount of time needed to understand the available functions increases. The main signal path from "mic in" to "line out" is still fairly straightfoward as the requirements have not changed much since the days of "mono," but the routing for effects sends, cue feeds, and stereo monitoring can be hard to visualize. It's often possible to overlook the significance of unfamiliar connections that are immediately obvious to the experienced recording engineer.

If you expect to find that "extra mix" quickly, you must be prepared to study the layout of the console thoroughly. In most instances, the physical arrangement of the controls on the top panel has very little to do with the sequence of electronic parts inside. The actual "wiring order" will determine what goes where and how, so this is the information you need in order to use the console successfully. As an example, if the controls on an *Input Channel* were actually placed in the sequence of the signal flow, the top panel would look like this. We'll include the patch points from the back panel in their wiring order as well as the faders and switches. Here's the comparison:


MIC IN Connector
PHANTOM Switch
INST IN Jacks
TAPE IN Jack
ACCESS SEND (PRE OUT) Jack
D OUT Jack
ACCESS SEND/RCV Jacks
MIC ATT Switch
PHASE Switch
INPUT Select Switch
TRIM MIC → TAPE
OVERLOAD LED
AUX 1/2 Signal Select Switch
AUX 1/2 GAIN
AUX 3/4 Signal Select Switch
AUX 3/4 GAIN
AUX 1/2 MUTE Switch & LED
AUX 3/4 MUTE Switch & LED
EQUALIZER ON Switch & LED
Three Section Semi-Parametric (Sweep) EQUALIZER
GAIN → FREQ
ASSIGN Switches
Channel ON Switch & LED
SOLO/PFL Switch & LED
PAN Pot
Input Fader
1a
1b
4a
2
8
16
10
1c
1e
7
6a, b
9
21
23
21
23
22
22
12
11
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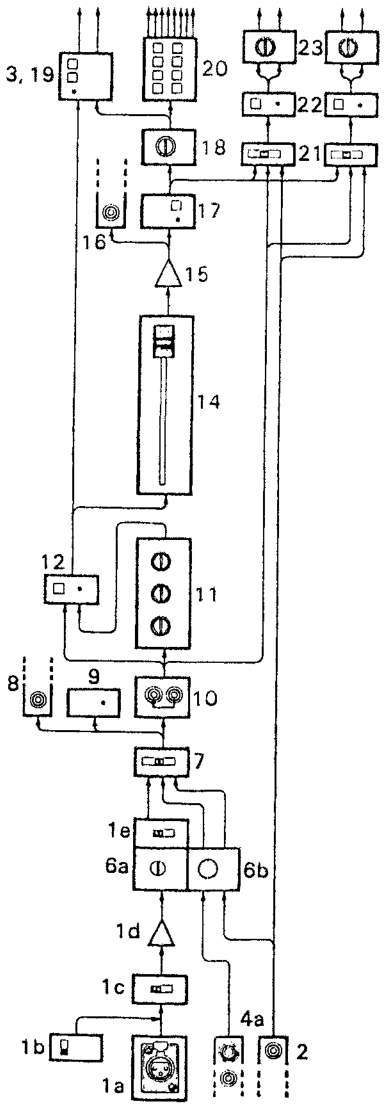
18
14

Top Panel Sequence


13, 19
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23
22
21
18
17
16
15
14
12
11
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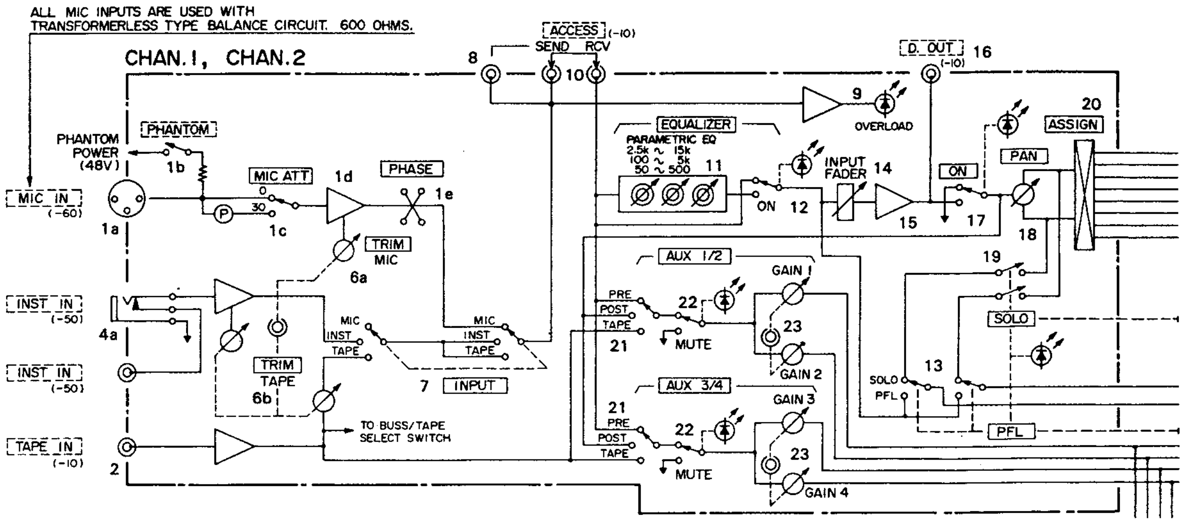
9
10
7
1e
6a
6b
1d
1c
4a
1b
1a
2

Wiring Sequence


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
PHANTOM POWER (48V)
PHANTOM
1b
MIC IN (-60)
1a
MIC ATT
0
30
P
1c
1d
PHASE
1e
TRIM MIC
6a
INST IN (-50)
4a
INST IN (-50)
TAPE IN (-10)
2
MIC
INST
TAPE
TRIM TAPE
6b
7
INPUT
TO BUSS/TAPE SELECT SWITCH
ACCESS (-10)
SEND
RCV
8
10
EQUALIZER
PARAMETRIC EQ
2.5k ∿ 15k
100 ∿ 5k
50 ∿ 500
11
ON
12
INPUT FADER
14
15
9
OVERLOAD
D. OUT (-10)
16
ON
17
PAN
18
ASSIGN
20
19
SOLO
13
SOLO
PFL
PFL
AUX 1/2
GAIN 1
PRE
POST
TAPE
21
22
MUTE
23
GAIN 2
AUX 3/4
GAIN 3
21
PRE
POST
TAPE
22
MUTE
23
GAIN 4

Block Diagram

While this arrangement of controls might help the first time user to understand the flow of signals in an *Input Channel*, it would be very inconvenient to operate. Still, the wiring sequence must be understood before the more complex functions of the console can be used, so along with the documentation you will need for service (schematic diagrams, mother board layouts, and mechanical disassembly information), we include a simplified electrical sequence chart called a *Block Diagram*.

This drawing shows all the controls, switches, amplifying stages, and connectors in their actual sequence. Learning to read it will provide the answers to any questions concerning "what comes where" on the inside. Things like "does the D. (Direct) OUT jack come before the EQ circuit or after it?", can be answered quickly. Yes, the Direct OUT jack is shown connected after the EQ section, so you will have EQ on any signal derived from that point.

If you have no prior experience in reading block diagrams, you can use the three illustrations we have provided here as a translator. Compare the reconstructed (as wired) *Input Channel* with legend to find out what each symbol represents. Even though the block diagram can indicate what is available in the way of extra circuit flexibility, it can't explain *why* a connection or switch has been included, or suggest a standard layout for your initial setup.

In the following sections of this manual, we do our best to describe the individual functions and controls of the console and how they can be arranged in more than one sequence. In the final analysis, your mixing needs may be best served by an arrangement of inputs and subsystems that you work out for yourself.
Some reference to the scientific terms used by our engineers will be necessary. The console does nothing useful unless it is connected properly to quite a lot of sophisticated equipment. Mics, tape recorders, power amps, and loudspeakers all play a part in the process of mixing/recording and each piece of equipment has its own technical vocabulary. We have tried to make this reference manual as simple as technology will allow. Each section and topic will give you some basic instruction in the terminology as well as a list of "what plug" goes into "which jack".

Even though there is a substantial amount of information available to the recording engineer, much of it assumes that the reader already has an engineering or scientific background and is comfortable with *"The Math."*
Practical rules of thumb are not generally available, and in fact, to operate a mixer no degree in science is necessary. You don't have to build a mixer "from scratch", you just need to know how to find the right control function to get the job done.

To begin our manual, we'll start with some basic information about *Sound* and the numbering systems used to describe energy levels in and out of the systems. *Impedance*, what the term means and how to deal with the details when you must connect the console to other equipment. Many aspects of scientific terminology will be discussed in the most basic terms we can. Whenever possible, the scientific terms will be related to understandable common references. Understanding what is going on inside your equipment will help improve your sound. Think of this manual as a reference handbook. You won't need all of what is here to begin, and it is certainly not necessary to memorize it, but do try to find the time to read it thoroughly at least once. That way you will be familiar with its contents and if you need the numbers they will be here waiting.
Good luck with your sound.

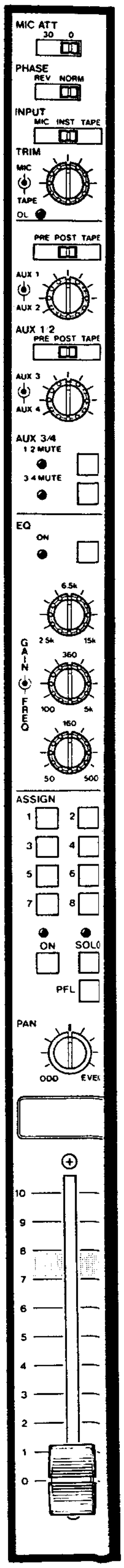
THE BLOCK DIAGRAM AND GAIN BLOCK DIAGRAM

Before you begin reading the next section of this manual, flip out the extra fold on page 67 ~ 70. On these pages we have printed the block diagrams for both the M-512 and M-520. They show the signal flow through the consoles and represent (in simple form) the actual electronic arrangement of all the jacks, controls and gain stages from *mic-in* to *line-out*.

There is very little difference in the two block diagrams; the primary differences are in the number of input channels, the way the last 4 meters function (there are 8 in the M-512 and 12 in the M-520), and the number of controls in the monitor section (8 or 16). Because the consoles, and their block diagrams, are so similar, we will use just one model's diagram to illustrate the signal paths and control functions elsewhere in this manual.

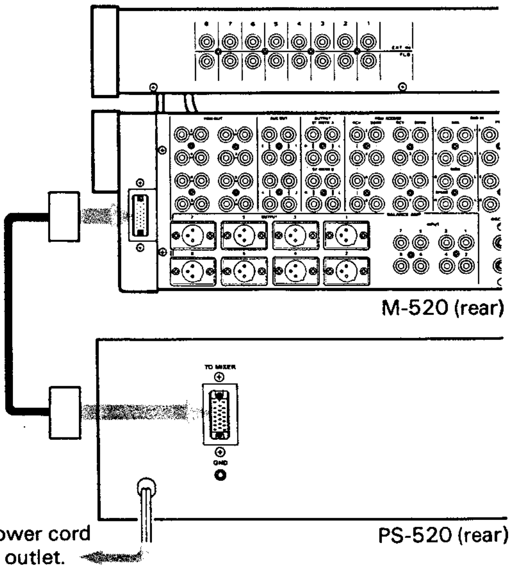
The diagrams on page 73 ~ 78 indicate the gain of a reference signal, the noise level, and the available reserve gain or headroom at any point in the signal chain. An experienced audio engineer would be able to operate the console successfully with just these diagrams and a list of input and output specifications.

Any question about function or gain can be answered by studying the drawings. Will the accessory send signal change in level if the input fader is moved? No, the signal is shown leaving the main line before the input fader. You read these diagrams from left to right, input to output.


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC INST TAPE
TRIM
MIC
TAPE
OL
PRE POST TAPE
AUX 1
AUX 2
AUX 1 2
PRE POST TAPE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
GAIN
FREQ
2.5k
15k
360
100
5k
160
50
500
ASSIGN
1
2
3
4
5
6
7
8
ON
SOLO
PFL
PAN
ODD
EVE
10
9
8
7
6
5
4
3
2
1
0

Precaution for M-520

The M-520's operating power is supplied from PS-520 Power Supply Unit of the M-520. Before you use the M-520, connect the M-520 console with the PS-520 as follows:

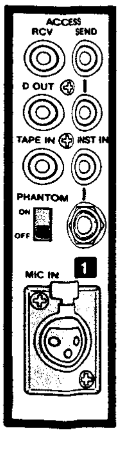

Connecting Cable (Supplied)
M-520 (rear)
TO MIXER
GND
PS-520 (rear)
Plug the power cord into an AC outlet.

Make sure the POWER switch is OFF or disconnect power line cord of the PS-520 before making these connections.

INPUT SECTION

In multitrack recording consoles, a description of signal "sequence" or flow is made more confusing by the multiple uses of the same circuit, depending on what point in the process you are considering. Broadly speaking, multitrack recording has three stages: *Basic tracking* – recording the initial track or tracks; *Overdubbing* – adding more to the *"Basic"* and finally, when all recording is complete, *Remixing* to the desired final format, stereo, mono, etc. Obviously, there is no real need to duplicate functions that can use the same parts at a later stage in the process. For example, you don't need a separate EQ section for the LINE IN or TAPE IN function, a simple re-routing switch to select the input signal, MIC, LINE, or TAPE will be all that is necessary. If we were to ignore the logic of the recording process, this description of signal flow in the console would be much easier for us and we could disregard the extremely large number of different possibilities. So that you will understand why a specific jack or function was incorporated we'll tell you what we had in mind when we built the console.

To save space, we use the wiring sequence as our logical "guide" to organize this manual and we'll describe the signal flow "options" as we come to them on a "once through" basis, which means that the wiring description will be logical, but the benefit or purpose of the feature may not be in the logical sequence of multitrack work. Because these consoles will use many of the same circuits more than once in the 3 step multitrack process, we will have to talk about overdub or mixdown related features at the beginning of this section before we have completed one complete signal path through the mixer to the recorder!



This manual presumes nothing about your past experience with the multichannel process except a willingness to learn. An expert in the field might see the significance of a control or jack with just a simple statement of its location, but in this manual we will point out "the obvious".

The terms that we use in the Index may not relate the use of these consoles to the field that you already know. For example, a musician will call the beginning of the tape the "top", because it relates to the top of a piece of music paper. An Audio-Visual producer would refer to the beginning of the program as "home" as in "return home" when thinking of the rewind function. This variation in the "jargon" makes the use of a conventional Index or Table of Contents difficult, and you have no guarantee of finding the help you need easily. Our job related sequence of instruction is self indexing to a much larger extent. It is likely that more than one person will be involved in the recording process sooner or later, but we have written this manual with the assumption that the first time user will start all alone. If you can comprehend the "solo" use of the console you should have no troubles converting the logic of the unit to accommodate extra "studio staff."

There are numerous basic signal input connectors on the M-512's 12 input channels and the M-520's 20 input channels, as shown in this chart:

	QUANTITY	
CONNECTOR FUNCTION	**M-512**	**M-520**
MIC INPUT	12	20
MULTI-PURPOSE TAPE INPUTS	8	16
2 TRACK TAPE INPUTS (A&B, L/R)	4	4
SECONDARY INPUTS (Phono, Inst)	4	4
LINE INPUTS	8	16

1. Mic Input Section:

a. MIC IN Connector

A balanced three conductor transformerless microphone input circuit is provided. Any mic with an output impedance from 50 to 600 ohms will work.

b. PHANTOM Power On/Off Switch

The phantom power supply in the console conforms to the DIN standard # 45 596, 48 volts DC applied to *both* pins 2 and 3 simultaneously through a pair of current limiting resistors (6.8k ohms). Since there are many other methods that are referred to as "phantom" that require a different voltage, or a different method of applying the voltage to the pins of the MIC IN connector, we strongly recommend that you check the manuals for the mics that you plan on using. Make sure that this phantom method is correct before you plug in. For some examples that may help you "cross reference", this 48V duplex phantom power circuit is correct for:

NEUMANN 80 series, such as km84, U87, 89.

SONY mics that use 48V (some use less voltage, but will work on 48V without causing problems).

This method WILL NOT operate condenser mics with AB standard such as the Sennheiser 405, 406 or 416.

Caution: Some other phantom power microphones will ground one side of the common 48V line we provide and your 48V mics will all turn off! You *must* isolate the input that has the other standard connected!

Even though duplex 48V phantom is safe for dynamic mics in theory, in practice, your mic cables may not allow exactly 48V to get all the way up to the mic. If there is any difference in the voltage supplied to pins 2 and 3 *at the mic end of the cable* you will have some voltage offset in the dynamic mic that can cause *damage to the sound, or damage to the mic!*

TURN OFF the *phantom power ON/OFF switch* (on the back panel) on all the inputs that don't need it!

c. MIC ATT Switch

Two positions are provided.

1) Set center, there is no effect.
2) Set fully left, a 30dB pad is inserted (the signal is reduced by 30dB). Switch in this pad when counterclockwise rotation of the MIC TRIM (full attenuation) cannot correct an overload condition originating at the MIC IN.

d. Differential Microphone Amplifier

This transformer substitute circuit does not show on the outside, but its contribution to the system is considerable. The low power signal that the mic generates must often be protected and isolated from other low power signals in the real world. Radio, power line hum, buzz, crackles, and switching noise when motors start up. (Do you have an air conditioner on your AC line)? — all these unwanted signals must be kept out of the very high gain amplifiers that are needed to raise the mic signal to a working level. The balanced or three-wire circuit and input isolation transformer becomes one way to deal with the problem. A circuit using a single *Differential* amplifier can do the same thing as a transformer, cancel any signal that is the *Same* on both incoming lines. A difference in signal on the two inputs is amplified, a common signal (anything that is the same on both pins), is *not passed*, and you get only the signal provided by the mic.

e. PHASE Reverse Switch

Since the MIC IN circuit is balanced at this point, it is possible to invert the "phase" or polarity of the incoming signal. Set center, the phase is unaltered. Set left, the switch reroutes pin 2 to wire 3, and pin 3 to wire 2, and thus the polarity of the incoming signal is reversed.

When a sound source is picked up by more than one microphone, the time displacement between each microphone's "hearing" of the signal can be different enough that the microphones actually cancel or add to each other to a greater or lesser degree; i.e., the sound may appear thinner or even fatter than anticipated due to the mic placement. Should this occur, "flipping" the phase on one or more of the microphones may cure the problem and eliminate the need to re-position the mics. Also, phase reversal may help to eliminate leakage from adjacent sound sources into a given microphone. The PHASE reverse switch will affect only the MIC input circuit.

2. Multi-Purpose Tape Inputs – All But The Last 4 Channels

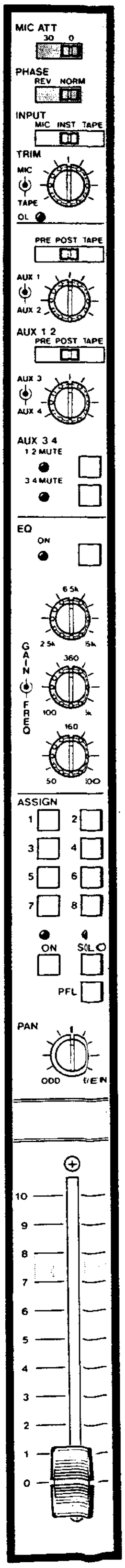
The TAPE INPUT provides signal to the channel's INPUT select switch and the AUX 1, 2 and AUX 3, 4 systems. The fact that the AUX 1, 2 and AUX 3, 4 systems have their own SIGNAL SELECT switch means that you may have a MIC IN selected as a source to feed the channel and *also* have a tape track feeding one or all four AUX systems *at the same time!* You may split the functions on the channel and each system can be used to do its own job.

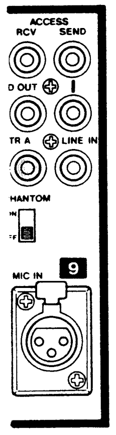
TAPE INs 1 through 8 on the M-512 (or TAPE INs 1 through 16 on the M-520) also provide signal to their respective BUSS/I(OFF)/TAPE switches in the MONITOR SECTION for monitoring the output of the 8 (or 16) track recorder without having to alter the controls or settings on the *Input Channels*.

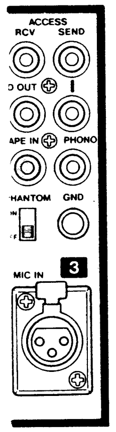
3. 2TR A&B Tape Inputs – Last 4 Channels

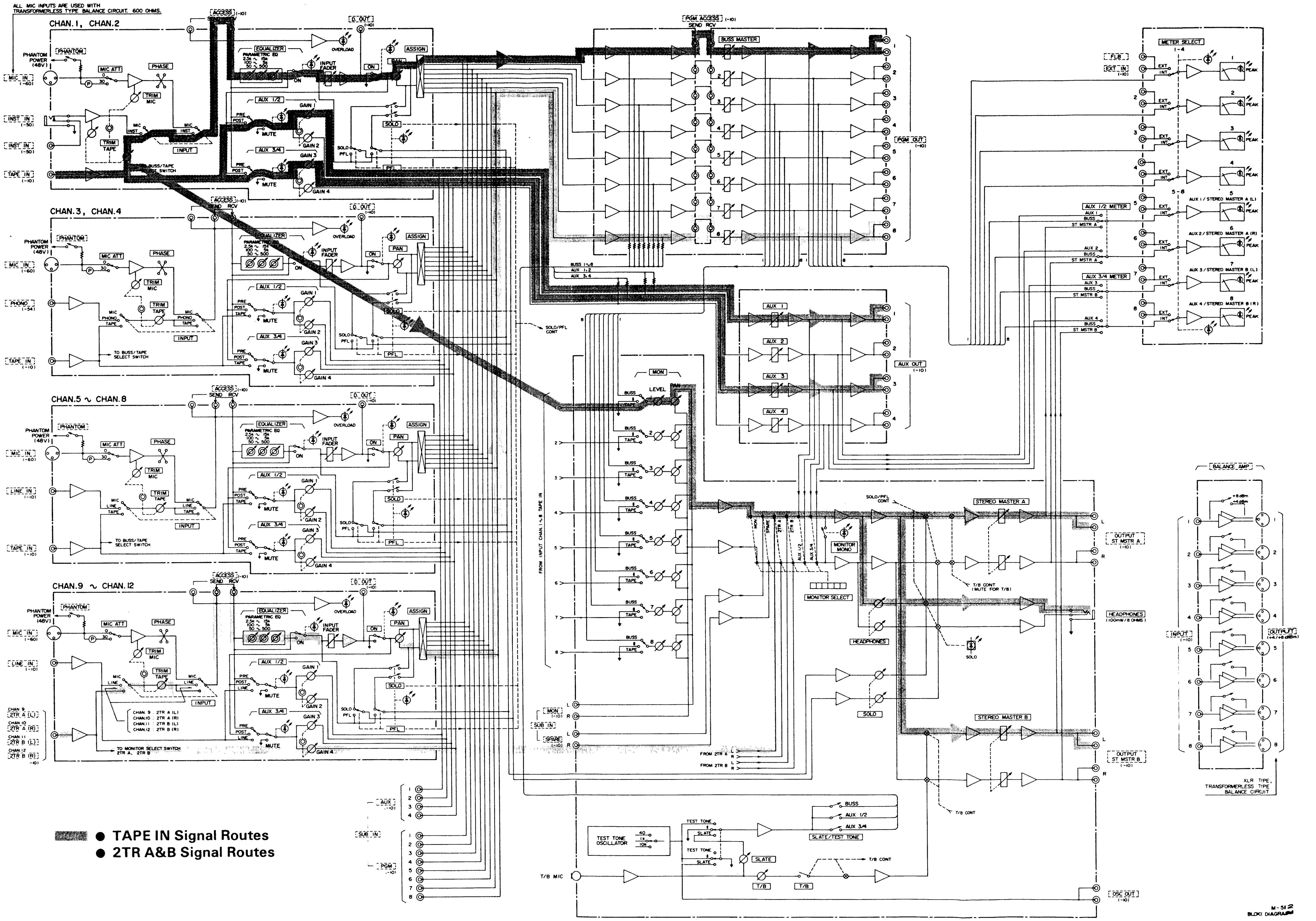
Located on the back panel of last 4 *Input Channels* each of these inputs provides signal to the channel's INPUT select switch. It also provides signal to the MONITOR SELECT switch rack where 2TR A selects the 2TR A, L/R inputs from channels 9 and 10 of the M-512 (or channels 17 and 18 of the M-520), and 2TR B selects the 2TR B, L/R inputs from channels 11 and 12 of the M-512 (or channels 19 and 20 of the M-520). We suggest that you consider using these two stereo inputs to the MONITOR as a two-track master monitor during *Remix* or as an effects return during *Overdub*.

In this way it is possible to monitor the *Mixdown* directly from the two-track or add effects return to your MONITOR mix without recording them.




ACCESS
RCV
SEND
D OUT
TR A
LINE IN
HANTOM
MIC IN
9

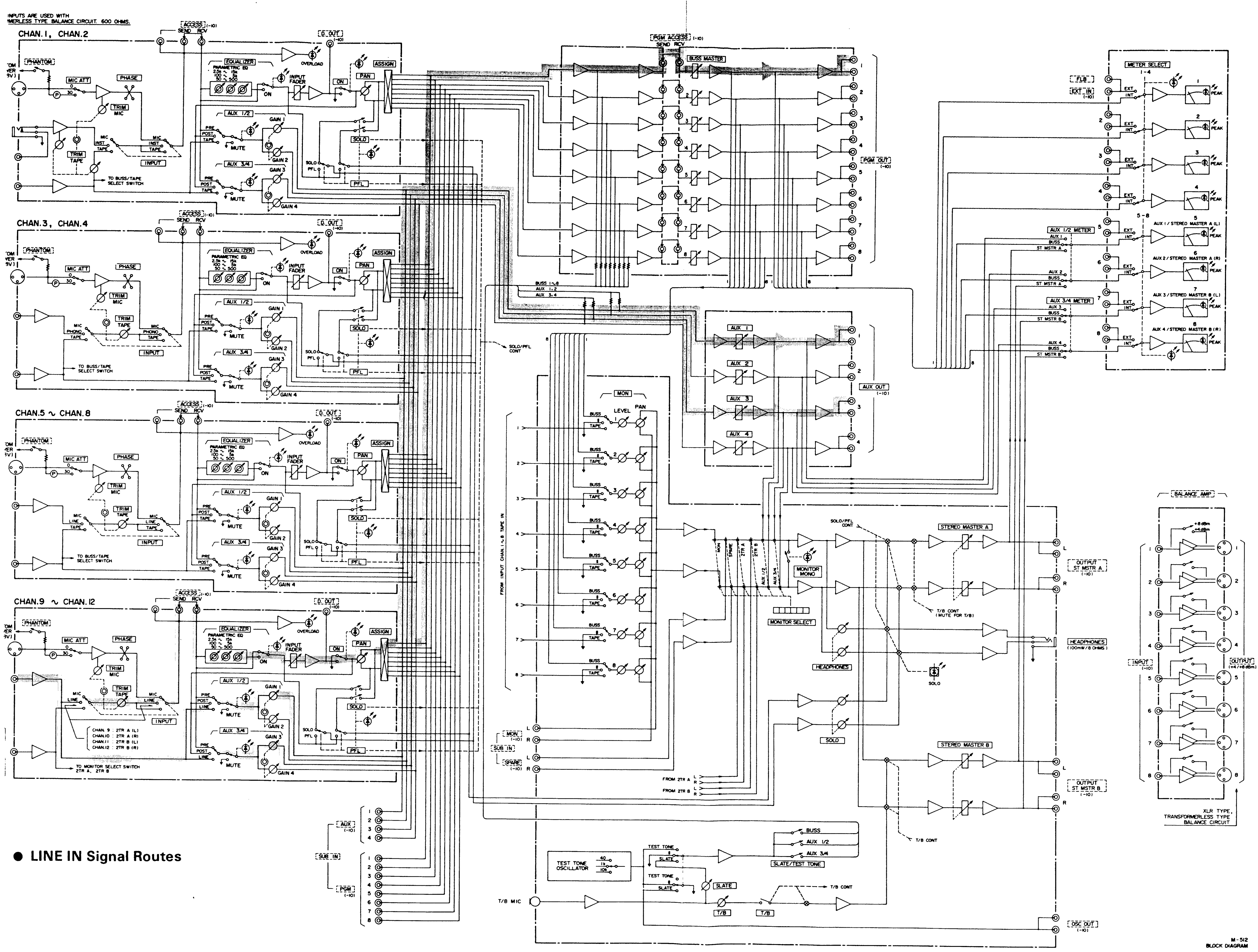

ACCESS
RCV
SEND
D OUT
APE IN
PHONO
HANTOM
GND
MIC IN
3


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN. 1, CHAN. 2
CHAN. 3, CHAN. 4
CHAN. 5 ~ CHAN. 8
CHAN. 9 ~ CHAN. 12
PHANTOM POWER (48V)
PHANTOM
MIC IN (-60)
INST IN (-50)
TAPE IN (-10)
PHONO (-54)
LINE IN (-10)
MIC ATT
PHASE
TRIM
MIC
TAPE
INPUT
BUSS/TAPE SELECT SWITCH
TO BUSS/TAPE SELECT SWITCH
ACCESS (-10)
SEND RCV
D. OUT (-10)
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
ASSIGN
PAN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
MUTE
SOLO
PFL
CHAN 9 2TR A (L)
CHAN 10 2TR A (R)
CHAN 11 2TR B (L)
CHAN 12 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1/2
AUX 3/4
SOLO/PFL CONT
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
MON
LEVEL
BUSS
TAPE
FROM INPUT CHAN. 1~8 TAPE IN
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
MONITOR SELECT
MONITOR MONO
SOLO/PFL CONT
STEREO MASTER A
STEREO MASTER B
T/B CONT (MUTE FOR T/B)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
SOLO
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B (-10)
T/B CONT
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
SLATE/TEST TONE
BUSS
AUX 1/2
AUX 3/4
T/B
T/B MIC
OSC OUT (-10)
FLB
EXT IN (-10)
METER SELECT 1-4
5-8
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
ST MSTR A
ST MSTR B
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
BALANCE AMP
INPUT (-10)
OUTPUT (+4/+8 dBm)
+8 dBm
+4 dBm
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT

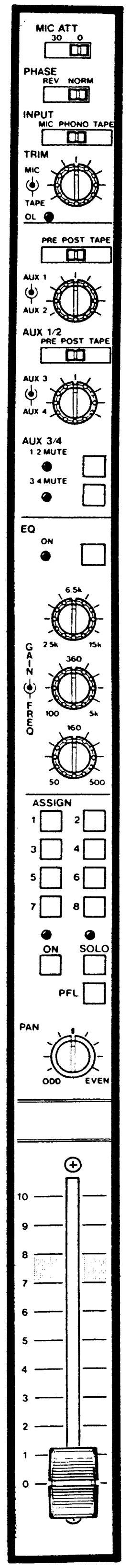
▨ ● TAPE IN Signal Routes

● 2TR A&B Signal Routes

M-512 BLOCK DIAGRAM


INPUTS ARE USED WITH
MERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
ACCESS (-10)
SEND RCV
D. OUT (-10)
PHANTOM
MIC ATT
PHASE
TRIM
MIC
TAPE
INPUT
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
PAN
ASSIGN
AUX 1/2
AUX 3/4
PRE
POST
MUTE
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
TO BUSS/TAPE SELECT SWITCH
TO MONITOR SELECT SWITCH 2TR A, 2TR B
CHAN. 9 : 2TR A (L)
CHAN.10 : 2TR A (R)
CHAN.11 : 2TR B (L)
CHAN.12 : 2TR B (R)
PGM ACCESS (-10)
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1, 2
AUX 3, 4
SOLO/PFL CONT
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
MON
LEVEL
BUSS
FROM INPUT CHAN. 1~8 TAPE IN
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
MONITOR MONO
MONITOR SELECT
HEADPHONES
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B (-10)
HEADPHONES (100mW/8 OHMS)
T/B CONT (MUTE FOR T/B)
T/B CONT
SOLO
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
TEST TONE
SLATE
SLATE/TEST TONE
T/B MIC
T/B
OSC OUT (-10)
METER SELECT 1-4
F/B
EXT IN (-10)
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
ST MSTR A
ST MSTR B
BALANCE AMP
+8 dBm
+4 dBm
INPUT (-10)
OUTPUT (+4/+8 dBm)
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
M-512
BLOCK DIAGRAM

● LINE IN Signal Routes


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC PHONO TAPE
TRIM
MIC
TAPE
OL
PRE POST TAPE
AUX 1
AUX 2
AUX 1/2
PRE POST TAPE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
2.5k
15k
GAIN
FREQ
360
100
5k
160
50
500
ASSIGN
1 2 3 4 5 6 7 8
ON
SOLO
PFL
PAN
ODD EVEN
10 9 8 7 6 5 4 3 2 1 0

4. Secondary Inputs

The term "Secondary Input" refers to an additional input connector other than the MIC and TAPE input connectors locate on *Input Channels* 1 through 8 of the M-512 (or 1 through 16 of the M-520). Functions include Instrument, Phono and Line inputs.

a. INST INput – Channels 1 and 2

Input Channels 1 and 2 each have a pair of INST IN jacks.

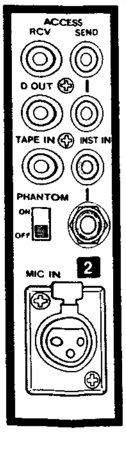
1) INST IN (RCA connector)
2) INST IN (1/4" phone jack)

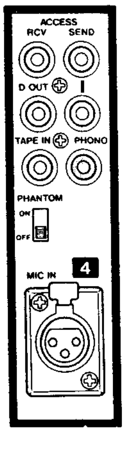
The two jacks are parallel wired. However, when a signal source is connected to the INST IN 1/4" phone jack, the jack will disconnect the parallelled INST IN RCA connector from the circuit.

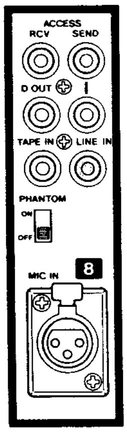
The INST INs will accept the signal "direct" from most electric guitars and basses. With some "hot" pickups you may have to turn down the instrument volume control to avoid overload, or adjust the TAPE (LINE) TRIM control.

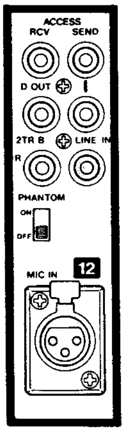
b. PHONO Input – Channels 3 and 4

The PHONO input on *Input Channels* 3 and 4 allows the use of a stereo turntable without the need for the purchase of a separate preamp. RIAA EQ is provided, and the input impedance is 50k ohms. the PHONO input has been incorporated for convenience in production which require Library materials to be incorporated; i.e., Multi-Image, Non-Sync filmwork, wild track, or to check a test pressing.


ACCESS
RCV
SEND
D OUT
TAPE IN
INST IN
PHANTOM
ON
OFF
MIC IN
2

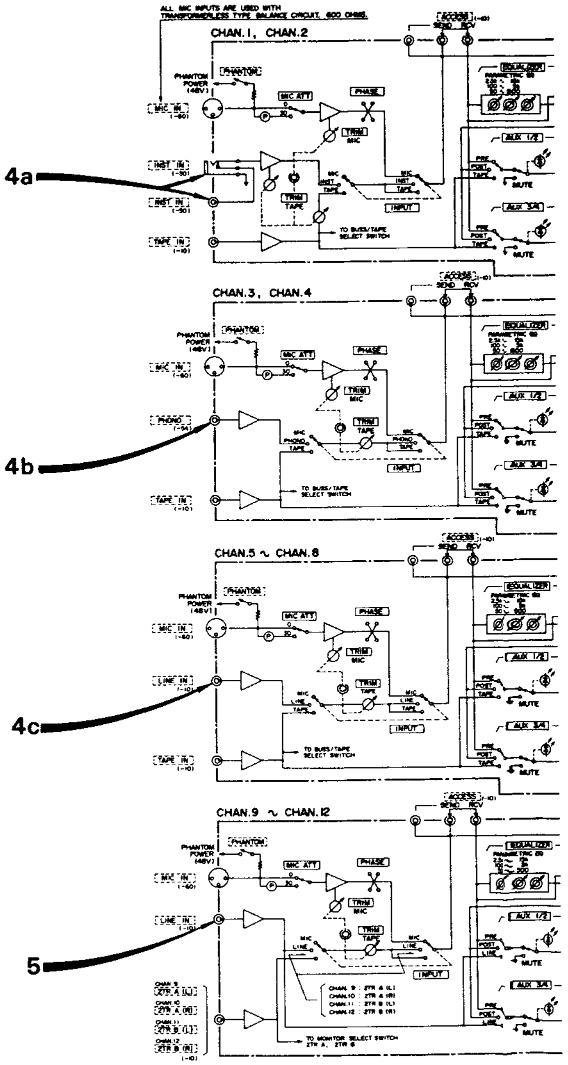

ACCESS
RCV
SEND
D OUT
TAPE IN
PHONO
PHANTOM
ON
OFF
MIC IN
4


ACCESS
RCV
SEND
D OUT
TAPE IN
LINE IN
PHANTOM
ON
OFF
MIC IN
8


ACCESS
RCV
SEND
D OUT
2TR B
LINE IN
R
PHANTOM
ON
OFF
MIC IN
12

c. LINE INputs – Channels 5 through 8 (or 16)

The LINE INs on *Input Channels* 5 through 8 on the M-512 (or 5 through 16 on the M-520) will accept signal from any line level source. Many electronic pianos and synthesizers are compatible with these inputs.


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
ACCESS
SEND
RCV
PHANTOM POWER (48V)
PHANTOM
MIC IN
MIC ATT
PHASE
TRIM
MIC
TAPE
INST IN
PHONO
LINE IN
TAPE IN
INPUT
TO BUSS/TAPE SELECT SWITCH
TO MONITOR SELECT SWITCH
EQUALIZER
AUX 1/2
AUX 3/4
PRE
POST
MUTE
4a
4b
4c
5

5. 4 Secondary Multi-Purpose Line Inputs

The LINE INput on channels 9 through 12 on the M-512 (or 17 through 20 on the M-520) provides signal to the respective *Input Channel's* INPUT select switch and the channel's AUX 1, 2 and 3, 4 systems. You can have either of the other two inputs (MIC IN or 2 TR input) on these channels feeding the channel and simultaneously select LINE IN to feed the AUX 1, 2 or AUX 3, 4 systems. In this way the functions on the channel may be split and each system can be used separately as required.

6. Trim

Used in conjunction with the OL (Overload) LED, TRIM will reduce the level of those *Input* signals which would otherwise overload the subsequent electronics in the signal chain. Each *Input Channel* is equipped with a MIC TRIM and a TAPE (LINE) TRIM to avoid having to reset the trim or fader when alternating between the MIC IN and another of the inputs to the channel.

a. MIC TRIM (Upper Section)

This control provides variable attenuation to signal originating at the MIC IN. If additional gain reduction is needed, insert the MIC ATT.

b. TAPE (LINE) TRIM (Lower Section)

Provides variable attenuation to signal originating at inputs to the channel other than the MIC INput.

7. Input Select Switch

This three position switch determines which input is to be routed through the channel, and the pre and post feeds to the AUX 1, 2 and 3, 4 systems.

a. Set Left

Select the MIC IN (all channels).

b. Set Right

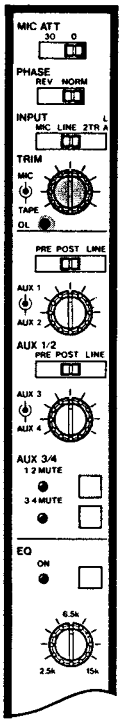
Selects the TAPE IN; on the last 4 channels this selects the 2TR A and 2TR B TAPE IN, while all other channels it selects the MULTI-PURPOSE TAPE IN.

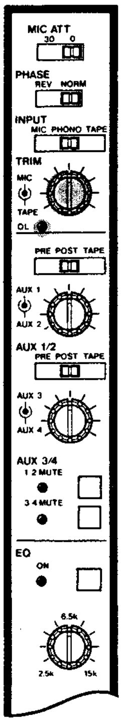
1) TAPE - Channel 1 through 8 of M-512 or 1 through 16 of M-520
   This position provides the mixer's full control capability (EQ, effects, mixing, etc.) for final *Remix* or fine tuning of the playback of the multitrack tape.
2) 2TR A and B – Last 4 channels
   Playback from the mixdown deck or any other stereo recorder requiring the mixer's full control capability would be the logical use for this position. However, we suggest you consider using this position as an effects return. You may wish to use 2TR A, L/R to return the effects and 2TR B, L/R for playback of your two-track master.

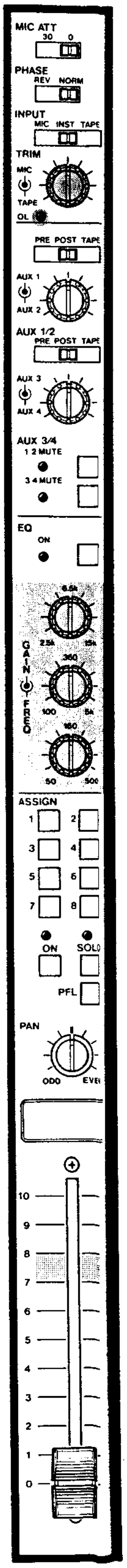
c. Set Center

Selects the SECONDARY INPUT on channels 1 through 8 of M-512 (or 1 through 16 of M-520) and the SECONDARY MULTI-PURPOSE INPUT on *Input channels* 9 through 12 of M-512 (or 17 through 20 of M-520).

1) INSTrument – Channels 1 and 2
   The INST INs may be considered as *direct boxes.*


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC LINE 2TR A
TRIM
MIC
TAPE
OL
PRE POST LINE
AUX 1
AUX 2
AUX 1/2
PRE POST LINE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
2.5k
15k


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC PHONO TAPE
TRIM
MIC
TAPE
OL
PRE POST TAPE
AUX 1
AUX 2
AUX 1/2
PRE POST TAPE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
2.5k
15k


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC INST TAPE
TRIM
MIC
TAPE
OL
PRE POST TAPE
AUX 1
AUX 2
AUX 1/2
PRE POST TAPE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
2.5k
15k
GAIN
FREQ
360
100
8k
160
50
500
ASSIGN
1
2
3
4
5
6
7
8
ON
SOLO
PFL
PAN
ODD
EVEN
10
9
8
7
6
5
4
3
2
1
0

2) PHONO – Channels 3 and 4
   Select this position to preamplify the output from a turntable.
3) LINE – Channels 5 through 12 (or 20)
   Selects signal from the LINE IN to the channel.

8. Extra Access Send (Pre Out) RCA Jack

Is the preferred point for *Cue* mixes. A mix made from this point by adding an accessory mixer (Model 1) will not change if you move the input fader, use the mute function, or adjust the EQ. The only thing that is more frustrating to a player than having the *Cue* "jump around" in the headphones is to have the sound of a critical part disappear entirely. The pre out avoids this problem.

9. OL (Overload) LED

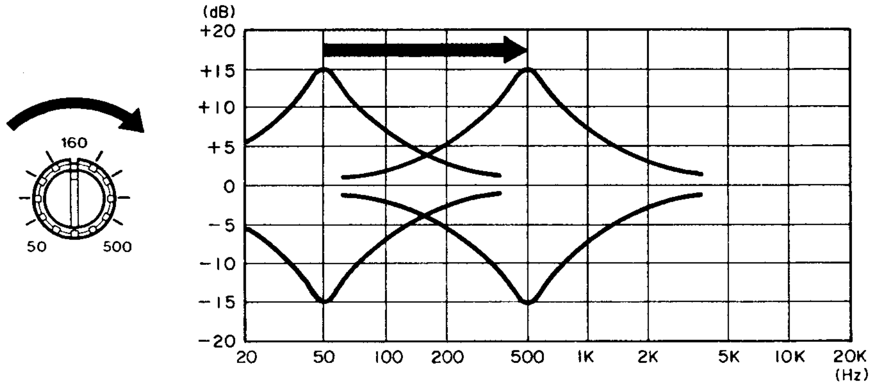
When signals high enough to make the ACCESS SEND (Pre Out) outputs exceed +15dB are applied to the channel, this LED will light. Adjust the appropriate gain reducing control (TRIM, or MIC ATT) until this LED remains out when signal is present. When working with extremely percussive transient material, maximum TRIM and MIC ATT may be required to prevent this LED from flashing on strong "peaks". Changing to a less sensitive mic may help.

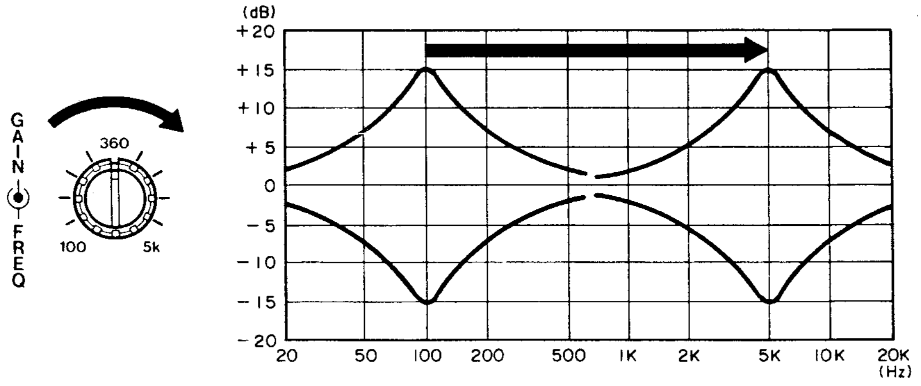
10. Access Send-Rcv Jacks

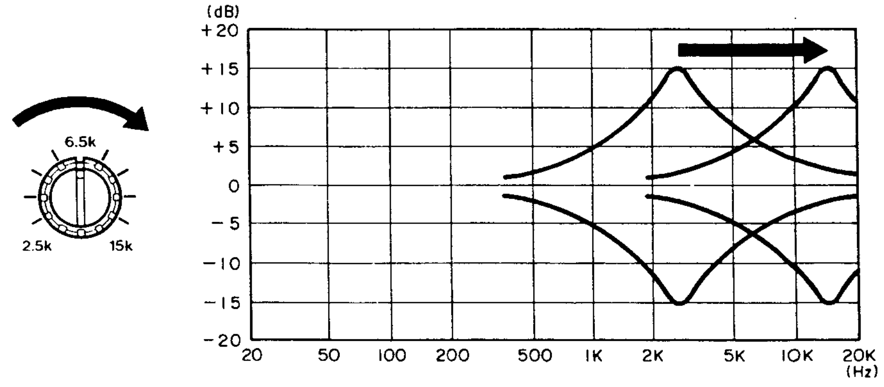
The high gain provided by the mic preamplifier allows us to place our first "patch point" in this useful location. A limiter connected to this point in the console can be set to a range of compression that will not be altered when the input fader is moved, or the EQ is adjusted. When no accessory device is bridged from the SEND jack to the RCV jack, the jumpers provided *MUST* be in place for signal to flow to the EQ amps and on through the console. There is no "normal" or automatic internal connection when the jumpers are removed.

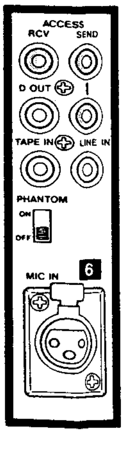
11. Three Section Semi-Parametric Type (Sweep) Equalizer

The classical definition of the word parameter is a variable, such as; weight, length, height, etc. In our case the term "parameter" refers to the adjustable frequency point. The "parameters" or "rules" are not fixed at any specific number, but are continuously variable. Two aspects of the circuit, the frequency center point and the "boost" or "cut" in gain are adjustable without "steps". Here are three graphs showing the control ranges of each of the three sections. Each section provides some "overlap" of the previous section in regards to the frequency range.









The great advantage of a parametric or continuously "tunable" equalizer over the more conventional "fixed center frequency" types is that you can adjust the frequency center point to the precise area you need and then the cut or boost you use will be more effective. You get the result needed with less rotation of the control, and this puts less "strain" on the electronics. No matter how many "frequencies" there are on a "set" type EQ it is unlikely that any one will prove to be "just right" and many more ranges are needed to do the job.

"Less" is always the best working concept in audio, so use the EQ after all other methods have been exhausted.

Move the mic, change the mic, and finally — try the "cut" functions of the EQ first.

Even experienced engineers have a tendency to forget that "cutting" the lows will have a similar effect to "boosting" the highs, and puts less of a strain on the electronics. The results are not identical but they are close enough to warrant trying. Cut bass, raise the overall gain, and see if it sounds better than just "boosting" the highs.

12. Equalizer On Switch, LED Indicator

This switch is provided to engage or bypass the channel's entire EQ section with a single control. A setting can be compared to "flat" by alternately switching in and out, or, the setting can be bypassed until needed and "dropped in" with a single action.

Up, the equalizer is bypassed.

Down, the equalizer is engaged.

When the EQ ON switch is depressed, the LED will light to remind you that the EQ has been engaged.

13. PFL (Pre-Fader Listen) Switch, LED Indicator

In radio and PA, there are many instances when it is desirable to check a signal *before* opening the fader and committing the signal to broadcast or a "House feed". Is the mic working? Do you wish to talk to an announcer before going "on the air" or do you need to ask a vocal group a question (and hear the answer) about the *Cue* balance while doing a background vocal? Use this PFL function. When this push switch is depressed, the pre-fader signal goes directly to the SOLO circuits, replacing whatever signal group or groups you have selected on the MONITOR SELECT switch rack. PFL signal will be heard "center mono", and more than one PFL may be depressed at a time. Push to enable, push again to release. The switches latch to make a "Mix". Depressing the PFL switch will activate the channel's SOLO LED.

In addition, depressing one or more PFL switches will turn on the large SOLO LED on the upper right side of the console to warn you that the MONITOR SELECT switch rack has been bypassed. Why? If the MONITOR has been bypassed by the accidental depression of a SOLO or a PFL button, and, there is no signal in the circuit that is soloed, *THE MIXER MAY APPEAR TO BE INOPERATIVE!* No other MONITOR function or mixing control can affect the signal sent to the ST MSTR A L/R OUTs or the HEADPHONES jacks until you release the unwanted SOLO or PFL function. Even if you are positive that there *IS* signal in a soloed channel, you may forget to advance the separate SOLO volume and you will still hear nothing.

The PFL signal is affected by the EQ ON switch, which changes the signal pickoff point. You can't hear the effect of equalization if the EQ ON switch is released.

14. Input Fader

The main mixing control for individual signals on the console.

Faders, also called "pots" (potentiometers) or attenuators always cause loss in order to control signal.

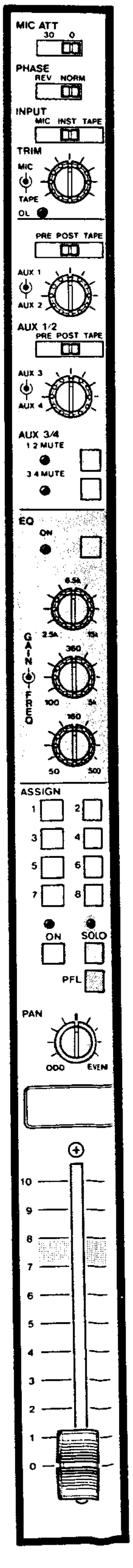
15. Input Channel Buffer Amp

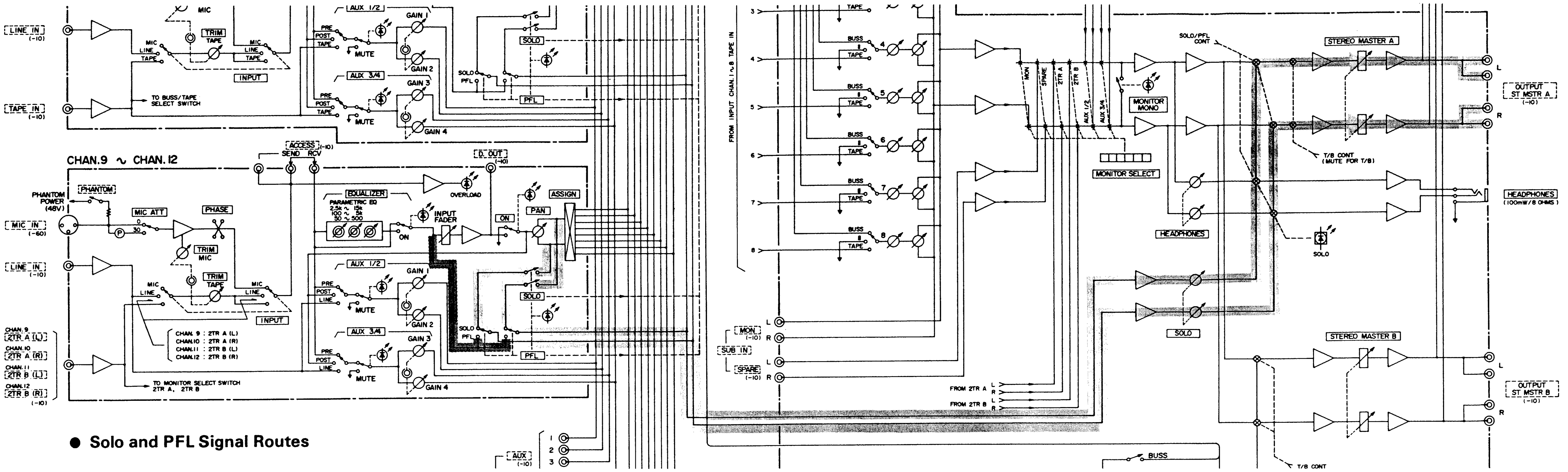
This amplifier has a gain of 8 dB, but its primary purpose is not really signal "boosting". It is here to isolate the input fader from the effects caused by the connection and disconnection of the circuits that follow.

16. Direct Out RCA Jack

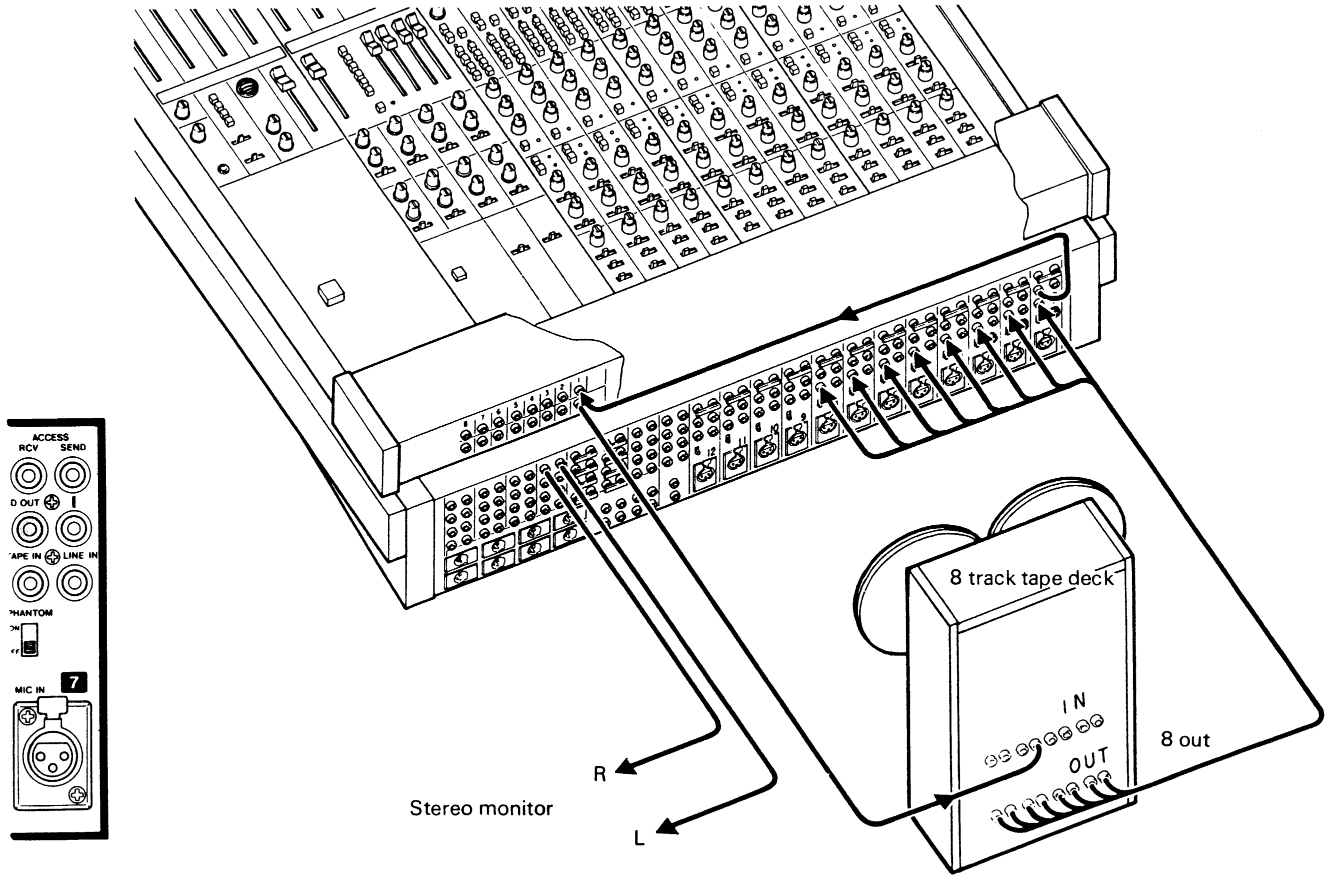
The specifications of the console's gain stages and summing networks are as close to ideal as we can offer. However, the fewer the number of parts, amplifiers, and summing networks that the signal passes through, the lower the amount of noise and distortion. Therefore, consider using the Direct OUT (D. OUT) to feed a one mic per track signal to the recorder.

This output can also be used in combination with an outboard mixer to make up an additional *post* fader mix.




LINE IN (-10)
TAPE IN (-10)
MIC
TRIM
TAPE
LINE
INPUT
TO BUSS/TAPE SELECT SWITCH
AUX 1/2
GAIN 1
PRE
POST
MUTE
GAIN 2
AUX 3/4
GAIN 3
GAIN 4
SOLO
PFL
CHAN.9 ∿ CHAN.12
ACCESS (-10)
SEND RCV
D. OUT (-10)
PHANTOM POWER (48V)
PHANTOM
MIC ATT
PHASE
MIC IN (-60)
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
PAN
ASSIGN
CHAN. 9 : 2TR A (L)
CHAN.10 : 2TR A (R)
CHAN.11 : 2TR B (L)
CHAN.12 : 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
AUX (-10)
FROM INPUT CHAN. 1 ∿ 8 TAPE IN
BUSS
SOLO/PFL CONT
STEREO MASTER A
OUTPUT ST MSTR A (-10)
MONITOR MONO
MONITOR SELECT
T/B CONT (MUTE FOR T/B)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
SOLO
STEREO MASTER B
OUTPUT ST MSTR B (-10)
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
T/B CONT

● **Solo and PFL Signal Routes**


ACCESS
RCV SEND
D OUT
TAPE IN
LINE IN
PHANTOM
MIC IN
7
8 track tape deck
IN
OUT
8 out
R
L
Stereo monitor

● **Typical Example of Direct Out Usage**

17. Channel On Switch, LED Indicator

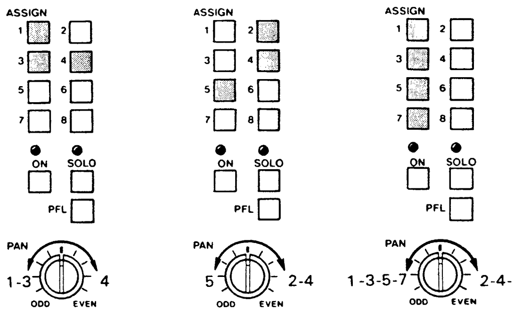
a. Located after the input fader in the signal chain, the Channel ON switch *simultaneously* disrupts the flow of signal to the PAN control and the POST position of the AUX 1, 2 and 3, 4 signal select switch.

b. The Channel ON switch can be used to assign a channel that has been preset and EQ'ed without having to reset the input fader accurately when you are rushed. The LED indicator will remain lit until the Channel ON switch is released.

c. The Channel ON switch does not affect the DIRECT OUT, ACCESS SEND, or the PRE position of the AUX 1, 2 and AUX 3, 4 signal select switch.

18. Pan Pot (Buss Select)

This knob works two rotary faders that are wired "back to back". As you rotate, one is turned up as the other is turned down, and the signal is shifted in stepless fashion from one BUSS to the other. When the control is "dead center", each fader is still reducing the signal slightly so that the signal transition through "center" does not become louder as you pan through it. Panning is possible only between odd and even numberred BUSSes.


ASSIGN
1 2
3 4
5 6
7 8
ON SOLO
PFL
PAN
1-3
4
ODD EVEN
5
2-4
1-3-5-7
2-4-6-8

Typical examples of multichannel panning

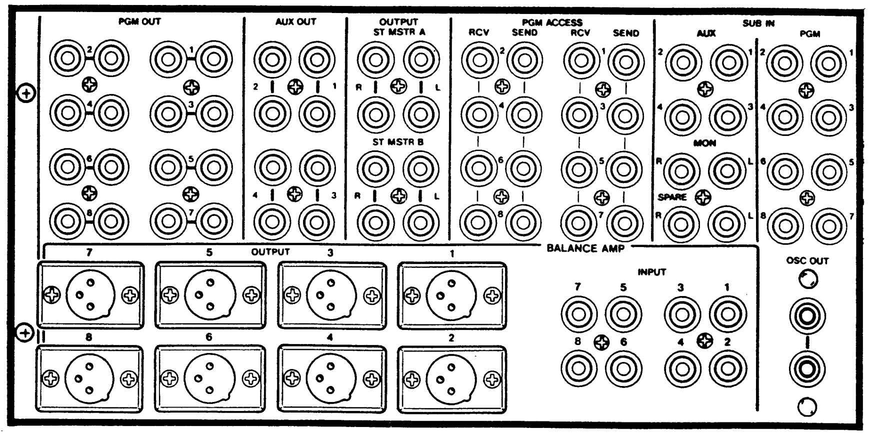
19. Solo Button, LED Indicators

Depressing this button will cause the signal on the *Input Channel's* main line to go directly to the SOLO master volume control, and then to the ST MSTR A OUTs L&R. The SOLO signal will temporarily replace the signal selected at the MONITOR SELECT switch rack.
Because the SOLO signal is taken off *after* the action of the PAN pot, this SOLO is a true *stereo* function and in *Remix* you will hear the effect of stereo placement as well as EQ, and level set by all other prior *Input Channel* controls.

only one BUSS has been selected, the pot still affects the stereo SOLO. SOLO s only the ST MSTR A OUTs L&R, the ts from busses 1 through 8 (which, with paralleled connectors, are labeled *PGM 1 through 8*), AUX OUTs 1 through 4, or annel's D. (Direct) OUT or extra ACCESS output (I). The same cautions apply to OLO function as the PFL in regard to a ble confusion about whether the mixer is ting or not. Recall that when either or PFL is engaged on a channel that has gnal in it, you will hear nothing in the TOR. To warn you, there is a master SO- L indicator on the upper right side of the console front panel, plus a smaller LED on each channel to show when SOLOs or PFLs are active.

20. Buss Assign Switches

This rack of eight switches is arranged in two columns; odd numbered, left, even numbered, right, indicating which "side" of the PAN pot they will be assigned to. As in all TASCAM mixers before the console, it is still possible to assign a channel to a single BUSS by depressing just one switch and avoid the inevitable increase in crosstalk caused by using the PAN as a part of the basic signal assignment scheme.


PGM OUT
AUX OUT
OUTPUT ST MSTR A
PGM ACCESS
RCV SEND RCV SEND
SUB IN
AUX
PGM
ST MSTR B
MON
SPARE
OUTPUT
7 5 3 1
8 6 4 2
BALANCE AMP
INPUT
OSC OUT

AUX SECTION

The two AUX systems consist of four mono non-dedicated busses which can be used for HEADPHONE CUE, EFFECTS SEND, ECHO SEND, SECONDARY MONITOR, BROADCAST REMOTE FEED, and reference RECORDING busses. The busses are paired in that the AUX 1 and AUX 2 gain controls are concentric and are fed the same signal from the AUX 1, 2 Select Switch, and the AUX 3 and AUX 4 gain controls are concentric and fed from a separate AUX 3, 4 Select Switch. This enables the paired busses to be used for four discrete mono mixes, two stereo mixes, or one stereo and two mono mixes.

21. AUX 1,2 & 3, 4 Signal Select Switches

a. Set Left (PRE)

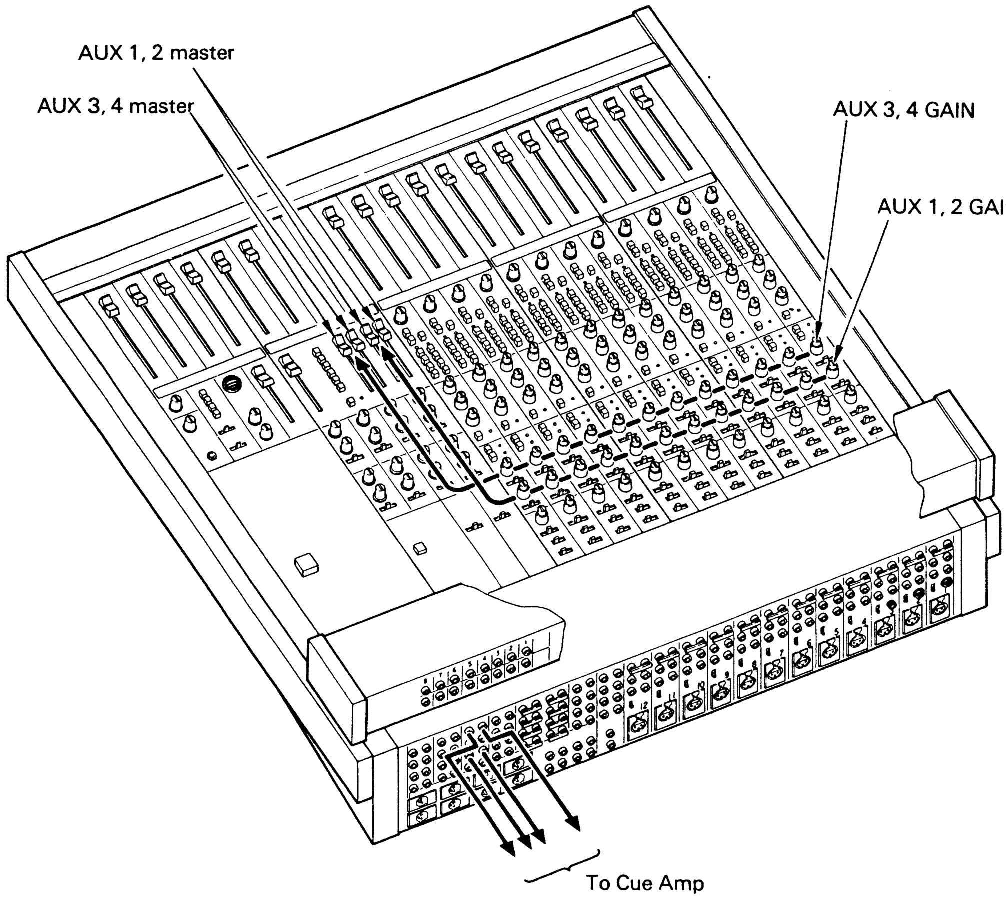
Pre-fader signal is taken from the stage preceding the fader and EQ, so it is not affected by the channel's fader or EQ settings, making this setting useful for stable *Cue* mixes.

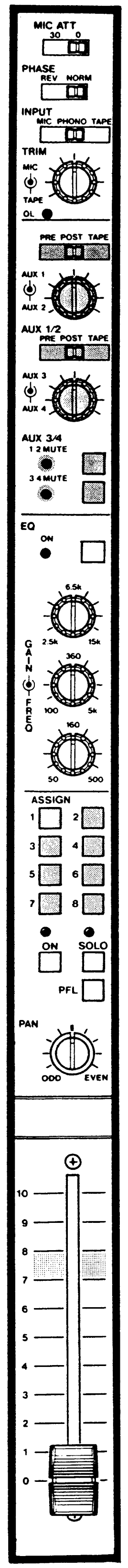
b. Set Center (POST)

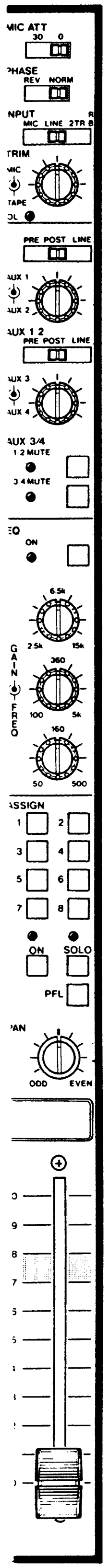
Selects *post-fader* signal from the point in the channel right after the MUTE switch. Because signal feeding this position will be subject to any adjustments to that channel's inputs fader, this position is usually preferred for *effects* or *echo* mixes.

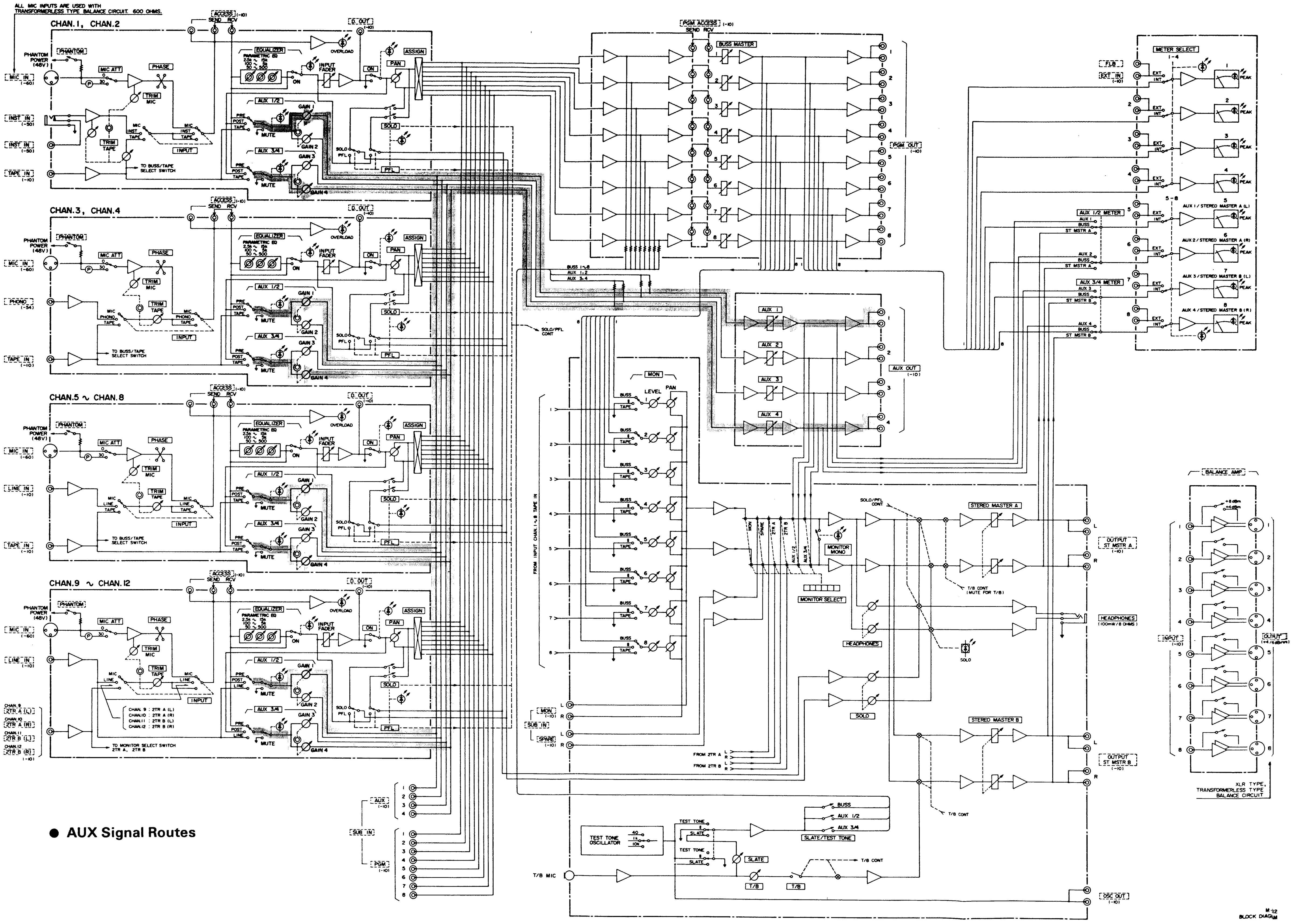
c. Set Right

1) TAPE – All but the last 4 channels
   Selects the MULTI-PURPOSE TAPE IN. This is the preferred position to set up the performer's *Cue* mix for overdubbing which requires the ability to combine the already recorded tracks with the new material. By monitoring the recorders output while in Sync mode, you will have both the new and pre-recorded material available for an independent *Cue* mix.
   When checking the overdub, the *Cue* system will now be fed all of the recorded tracks at relatively the same mix levels as occurred during the recording.
2) LINE – Last 4 channels
   Selects the channel's SECONDARY MULTI-PURPOSE LINE IN. This line level input can be selected to feed the AUX systems while one of the other remaining input separately feeds the channel.
   The LINE setting is very useful as a way to return submixes or effects into one or all four of the AUX systems.


AUX 1, 2 master
AUX 3, 4 master
AUX 3, 4 GAIN
AUX 1, 2 GAIN
To Cue Amp


MIC ATT
30 0
PHASE
REV NORM
INPUT
MIC PHONO TAPE
TRIM
MIC
TAPE
OL
PRE POST TAPE
AUX 1
AUX 2
AUX 1/2
PRE POST TAPE
AUX 3
AUX 4
AUX 3/4
1 2 MUTE
3 4 MUTE
EQ
ON
6.5k
2.5k 15k
360
100 5k
150
50 500
GAIN
FREQ
ASSIGN
1 2 3 4 5 6 7 8
ON SOLO
PFL
PAN
ODD EVEN
10 9 8 7 6 5 4 3 2 1 0


MIC ATT
PHASE
INPUT
TRIM
AUX 1 2
AUX 3/4
EQ
GAIN
FREQ
ASSIGN
ON
SOLO
PFL
PAN
ODD
EVEN


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
ACCESS (-10)
SEND RCV
D. OUT (-10)
PHANTOM POWER (48V)
MIC IN (-60)
INST IN (-50)
PHONO (-54)
LINE IN (-10)
TAPE IN (-10)
MIC ATT
PHASE
TRIM
INPUT
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
PAN
ASSIGN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
TAPE
MUTE
SOLO
PFL
TO BUSS/TAPE SELECT SWITCH
TO MONITOR SELECT SWITCH 2TR A, 2TR B
CHAN. 9 : 2TR A (L)
CHAN. 10 : 2TR A (R)
CHAN. 11 : 2TR B (L)
CHAN. 12 : 2TR B (R)
PGM ACCESS (-10)
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1, 2
AUX 3, 4
SOLO/PFL CONT
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
MON
LEVEL
PAN
FROM INPUT CHAN. 1~8 TAPE IN
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
MONITOR MONO
MONITOR SELECT
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B (-10)
T/B CONT (MUTE FOR T/B)
HEADPHONES (100mW / 8 OHMS)
SOLO
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
TEST TONE
SLATE
SLATE/TEST TONE
T/B
T/B MIC
T/B CONT
OSC OUT (-10)
FLB
EXT IN (-10)
METER SELECT
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
ST MSTR A
ST MSTR B
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
BALANCE AMP
INPUT (-10)
OUTPUT (+4/6dBm)
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
M 32 BLOCK DIAGRAM

● **AUX Signal Routes**

UX 1, 2 or 3, 4 Mute Switch, LED Indi- ator

UX MUTE switch will interrupt the flow nal to the AUX GAIN controls, will turn e LED MUTE indicator, and will affect all ns of the AUX signal select switch. By etting the level of the AUX GAIN and then ssing the AUX MUTE switch, a one but- drop in" can be performed by releasing UX MUTE switch at the desired moment.

UX 1, 2 and AUX 3, 4 Gain (Dual oncentric Control)

dual gain controls are provided for each four AUX busses. However, the controls aired with AUX 1 atop AUX 2 in one dual ntric controls, and AUX 3 atop AUX 4 in ther dual concentric control.

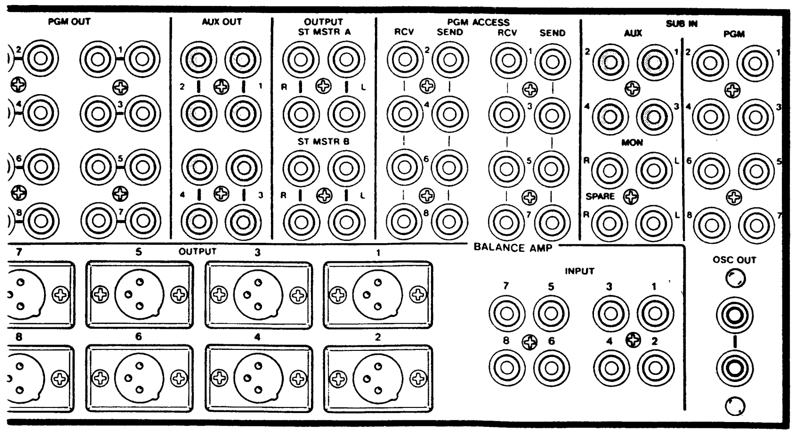
UX Sub IN 1 through 4 RCA Jacks

ine level signal may be introduced into UX systems at these patch points. These may be used to cascade the output another mixer into the AUX 1 through 4 .

there is no separate volume control just ese patch points, level control for these ons to your AUX mixes must come from evice that you have "patched in".

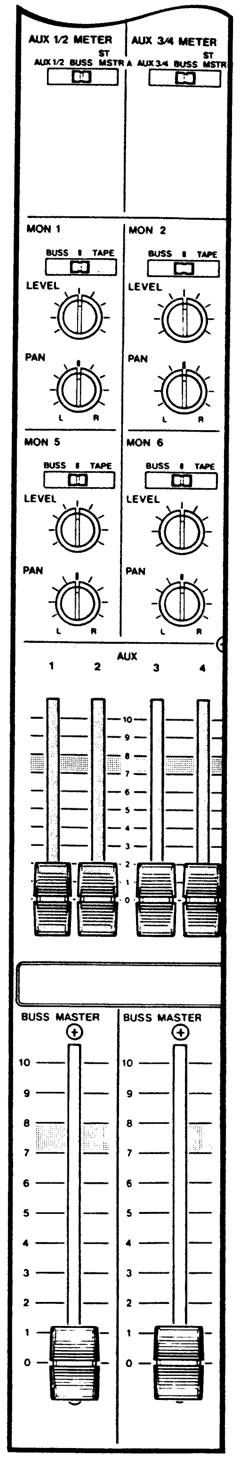
UX 1 through 4 Master Faders

of these *four* straight line controls pro- overall level adjustment of the AUX sig- nt to its respective AUX output jacks, the 1/2 or 3/4 METER select switch, and to ONITOR SELECT switch.



26. AUX Out 1 through 4 RCA Jacks

Each of these output jacks can be used for a variety of accessory functions; effects sends, *Cues*, monitor mixes, and the like. What you connect here will depend on the job you need done by the AUX systems at the time.



M-512

BUSS MASTER SECTION

27. Program Sub Ins, 1 through 8

These inputs may be used to accept the output of another mixer or any other line level source you wish to add. Since there is no separate volume control just for this patch point, level control for additional signal introduced here must come from the device that you have "patched in".

28. Master Buss 1 through 8 Combining Network and Summing Amplifiers

These amplifiers don't show on the outside but their contribution to the system is considerable. These devices allow the all input channels to add their signals together without one channel distorting the output of another. When you wish to "combine" or "sum" two or more varying voltages that are being used to represent sounds, a simple "joining together" of the wires *will not* work. This type of circuit protecting "summing amplifier" also appears in several other places inside the console:

AUX 1, 2;
AUX 3, 4;
MONITOR, L/R.

29. PGM Access Send/Rcv RCA Jacks

This pair of jacks is used to add an accessory or effects device (echo, flanger, what have you) to the entire group of signals on a BUSS. This feature is not provided on the AUX 1 through 4 busses. When no device is "bridged" across these jacks, the jumpers *must* be in place for signal to flow, as there is no "normal" or internal connection.

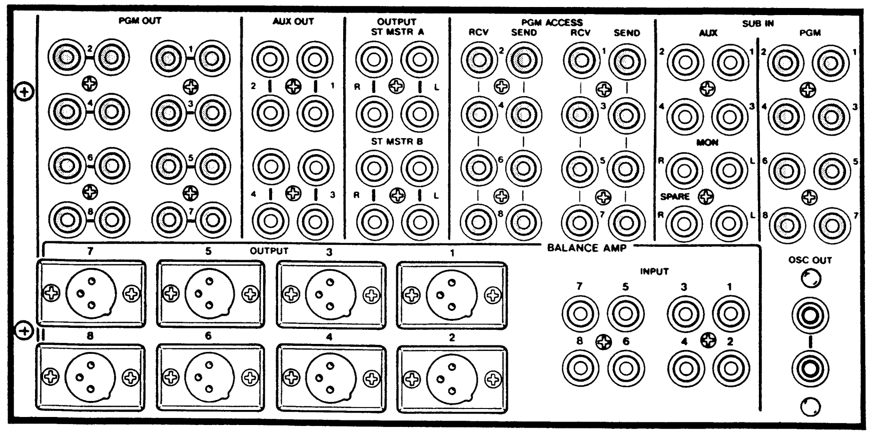
30. Buss Master Fader

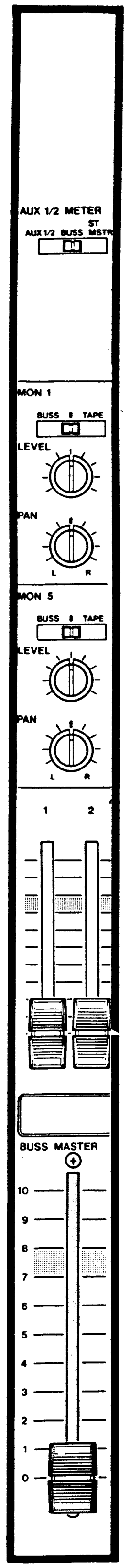
There are eight of these straight line faders, one for each of the eight BUSSes. Each BUSS MASTER fader controls the output from its buss summing amplifier. It is a "grand master" for all signals that have been assigned to the BUSS, from *Input Channels*, PGM ACCESS SEND/RCV, or the PROGRAM SUB IN. Use it to simultaneously adjust these three different "feeds":

a. The level sent to the PGM OUTs 1–8.
b. The level shown on the meters when their switches are set to read BUSSes 1–8.
c. The level sent to the MONITOR control group.

31. PGM Out RCA Jacks 1 through 8

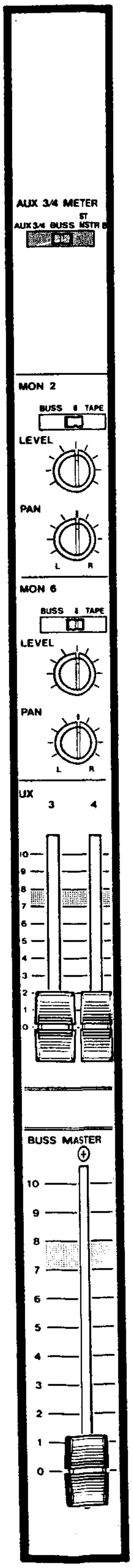
The final output of your mix. While there are 8 mixing busses, each buss is connected (in parallel) to two output jacks so that a 16 track recorder can be used without re-patching or "Y" adapters. Buss 1 feeds PGM OUT 1, Buss 2 feeds PGM OUT 2, and so forth. At this point, all functions have been applied to the signals. The only controls that remain are the sections of the mixer that allow you to see and hear what you are doing; the meters and the monitor feeds. We'll go to the block diagrams and with the outputs first (page 67–70).





M-512

MONITOR SECTION



M-512

32. VU Meters (1 through 8 of M-512, 1 through 12 of M-520)

These VU meters have the standard volume unit ballistic. They respond to the *AVERAGE* level of the signal not the *PEAK* level. The 0 VU point is set to equal 0.3 volts (–10dB referenced to 1 volt). Because the signal level sent to the meter amplifier proceeds the circuits that switch the reference levels of each BALANCE AMP OUTPUT XLR connector, from +4 dBm to +8 dBm, it is not necessary to adjust the meter amps or the LED driver circuits when you wish to change balanced output reference levels.

Meters 1 through 8 may be switched, in groups of 4, to display the level of signals other than the "normal", internally routed signals. Sixteen jacks on the rear of the meter pod are provided to patch in any 8 signals you wish, and to continue that signal path; METER SELECT (Int/Ext) switches adjacent to the meters select the "normal" or externally patched signals. In this case, calibration remains the same, with 0 VU equal to –10 dBV. The external jacks may be used to monitor individual channel direct outputs, tape inputs (which is the most common use), echo/effects returns, etc.

33. Peak LEDs

These light emitting diodes will react much more quickly than the meters, and are set to "flash" 10dB above "0VU". They will show you the difference between average and peak levels. On most percussion material (kick drum, latin percussion such as castanets or the Brazilian instrument called an afuche) you will see these LEDs flash *long before* the VU meters read anywhere near zero. Short term peak distortion may be hard to detect. Use discretion and experiment with the final meter level when you see these lights flash. They are telling you the truth about the *REAL* level that is being sent to the final output and "average" is not always a safe concept. For example, castanets should be recorded with no more than a –20 indication showing on the *averaging* VU meter. Even when the meter reads this low you may still see the LED flash. Take care and avoid overload.

It is normal for the console meters to jump when AC power is first applied, and the headphone amplifier may produce a substantial transient "pop" even if the HEADPHONES master pot is rotated fully leftwards (off).

Patching in mics and accessories with the faders down will insure that you don't damage your ears, the console or any other equipment that you may be using. Take care.

34. M-512, Last 4 VU Meters & Function switches – AUX (1/2 or 3/4)/BUSS/ST MSTR (A or B)

The M-512 has a pair of 3-position function switches that permit the meters for busses 5 and 6, and busses 7 and 8, to monitor any of 3 different signals (provided the METER SELECT switch is set to INTernal position; EXT position actually selects a fourth possible source).

a. Set Left – AUX 1/2 (Meters 5 & 6)
– AUX 3/4 (Meters 7 & 8)

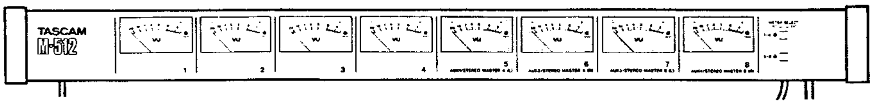
Meters 5 and 6 will now indicate the signal level appearing at the AUX 1 and AUX 2 outputs, or meters 7 and 8 indicate the signal level at the AUX 3 and AUX 4 outputs, respectively.

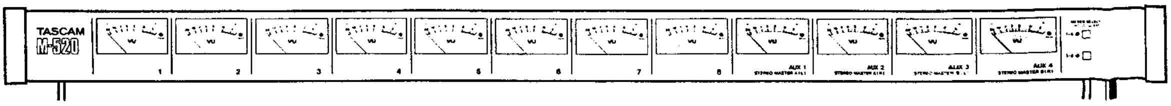
b. Set Center – BUSS (Meters 5 through 8)

Meters 5 and 6 will now indicate the signal level appearing at the PGM OUTs 5 and 6, or meters 7 & 8 indicate the level at PGM OUTs 7 and 8.

c. Set Right – ST MSTR A (Meters 5 & 6)
– ST MSTR B (Meters 7 & 8)

Meters 5 and 6 will now indicate the signal level appearing at the ST MSTR A OUTPUTs L/R (Stereo Master A), or meters 7 and 8 indicate the level at ST MSTR B OUTPUTs L/R.





35. M-520, Last 4 VU Meters & Function Switches – AUX (1, 2 or 3, 4)/▮/ST MSTR (A or B)

The last 4 meters on the M-520 can be switched, in groups of two, to indicate either of two internal sources.

a. Set Left – AUX 1/2 (Meters 9 & 10)
– AUX 3/4 (Meters 11 & 12)

Meters 9 and 10 will now indicate the signal level appearing at the AUX 1 and AUX 2 outputs, or meters 11 and 12 indicate the AUX 3 and AUX 4 outputs respectively.

b. Set Right – ST MSTR A (Meters 9 & 10)
– ST MSTR B (Meters 11 & 12)

Meters 9 and 10 will now indicate the signal level appearing at the ST MSTR A OUTPUTs L/R (Stereo Master A), or Meters 11 and 12 indicate the level at ST MSTR B OUTPUTs L/R.

Note: The first 8 meters of the M-520 normally indicate the level of the 8 BUSS outputs (provided the METER SELECT switch is set to INTernal position; EXT position actually selects a second possible source). The BUSS OUT level, indicated on these meters, actually indicates the level appearing at PGM OUT jacks 1 through 8; remember that BUSS 1 feeds PGM OUT 1, BUSS 2 feeds PGM OUT 2, and so forth.

36. MON BUSS/▮(OFF)/TAPE Signal Select Switches

These three-position switches determine which signals will be used to feed your MONITOR mix. There are 8 such switches on the M-512, and 16 on the M-520.

a. Set Left – BUSS
Signal appearing at the BUSS OUT (PGM OUT) having the same number as the switch will be made available to the MONITOR mix via the MONitor LEVEL and PAN controls located directly below the switch.

b. Set Center – ▮(OFF)
Signal is muted.

c. Set Right – TAPE
Routes signal from the MULTI-PURPOSE TAPE IN of the same number to the switch's corresponding MONitor LEVEL and PAN controls.

This provides an 8 × 2 monitor mix on the M-512 or a 16 × 2 mix on the M-520.

37. MON Level Control (x8 in M-512, x16 in M-520)

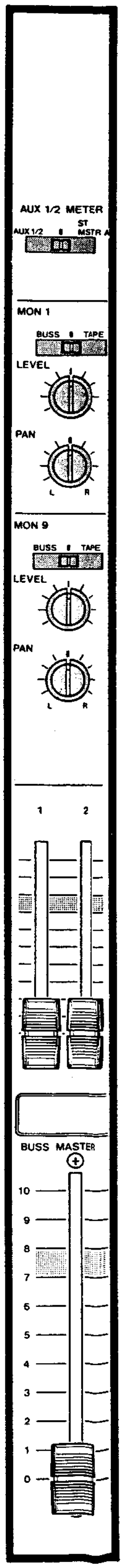
This pot controls the level of signal selected to appear in the MONITOR mix by its corresponding MON BUSS/▮(OFF)/TAPE signal select switch.

38. MON Pan Control (x8 in M-512, x16 in M-520)

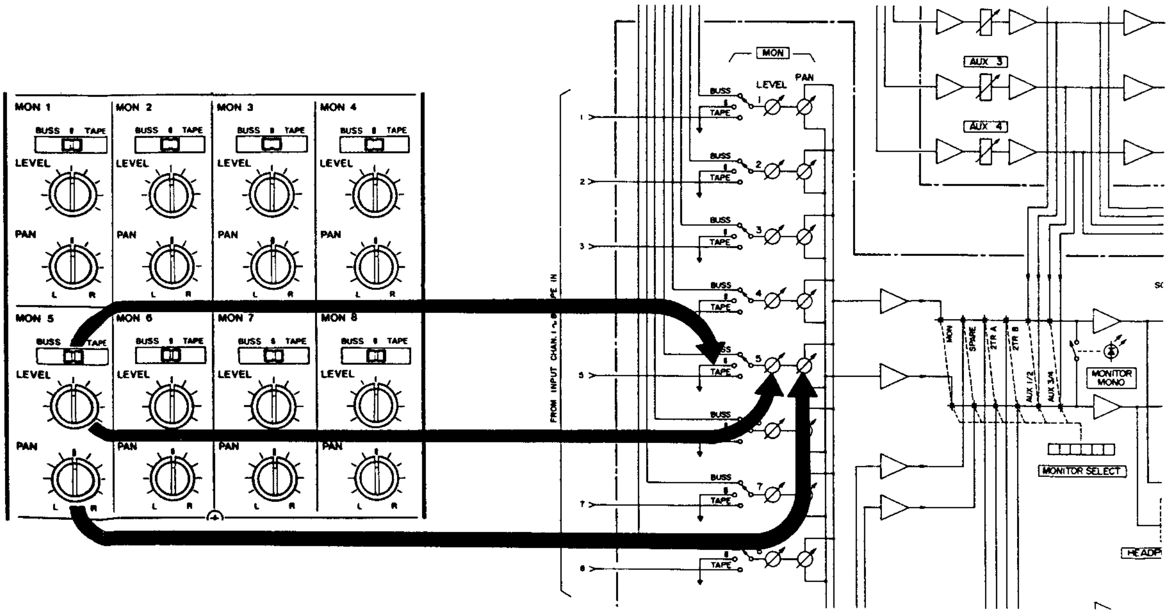
This pot determines the stereo placement of the signal selected by its respective MON BUSS/▮(OFF)/TAPE signal select switch and MON LEVEL control.

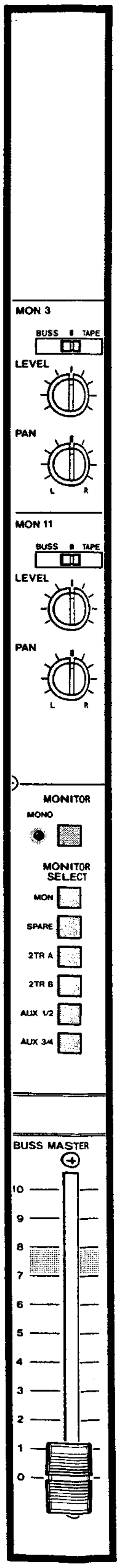
39. MON Sub In L/R RCA Jacks

This input is provided in order to add any appropriate signal to the MONITOR mix. Level control of this signal must come from the device that you are feeding in. There is no individual gain or pan on this input pair.


AUX 1/2 METER
AUX 1/2
ST MSTR A
MON 1
BUSS
TAPE
LEVEL
PAN
L
R
MON 9
BUSS
TAPE
LEVEL
PAN
L
R
1
2
BUSS MASTER
10
9
8
7
6
5
4
3
2
1
0

M-520


MON 1
MON 2
MON 3
MON 4
MON 5
MON 6
MON 7
MON 8
BUSS
TAPE
LEVEL
PAN
L
R
MON
LEVEL
PAN
AUX 3
AUX 4
FROM INPUT CHAN. 1~8
MONITOR MONO
MONITOR SELECT
HEADP



40. Monitor Select Switch Rack

If you examine the *Block Diagram* you will see that this signal select determines what will appear at both the ST MSTR A and B OUTPUT, L/R RCA jacks *and* the HEADPHONES tip-ring-sleeve final stereo output. There are 7 options, and since this switch rack can combine signals, any or all switches may be depressed simultaneously. There are several combinations of two or more of these switches that will solve listening problems that are common to the multitrack process, so we'll detail each option and it's benefit.

a. MON Switch

The first position selects the output of the MONITOR section (8 x 2 in the M-512, 16 x 2 in the M-520). Since this BUSS/ I(OFF)/ TAPE group is the *Basic* 8-track working system for the whole M-512 (8 or 16-track for the M-520), you will probably have it selected almost all of the time.

b. SPARE Switch

When depressed, selects the SPARE SUB IN L/R jacks on the rear panel. Any stereo input such as a submix or a two-track patched in to the SPARE SUB IN L/R jacks can be switched in and out of the STEREO MASTER A&B busses.

c. 2TR A Switch

Selects the 2TR A, L/R input jacks on channels 9 and 10 (M-512) or 17 & 18 (M-520). This position can be used to quickly switch the monitor to a two-track to check a mix down, or, to listen to a signal group *without* recording it as we stated in the previous section 2TR A&B, L/R input.

d. 2TR B Switch

Selects the 2TR B, L/R IN jacks at once on channels 11 and 12 (M-512) or 19 & 20 (M-520). This is basically a duplicate of the function provided by the 2TR A switch, but for the last 2 channels.

e. AUX 1, 2 Switch

Selects the AUX 1 and AUX 2 final mixes after the AUX 1 and 2 master faders. This position will allow monitoring and adjustment of these AUX mixes as they are sent out to cue amps, effects devices, and so forth. The two are switched together so they may be used for a single stereo mix, or they may be used as independent mono mixes.

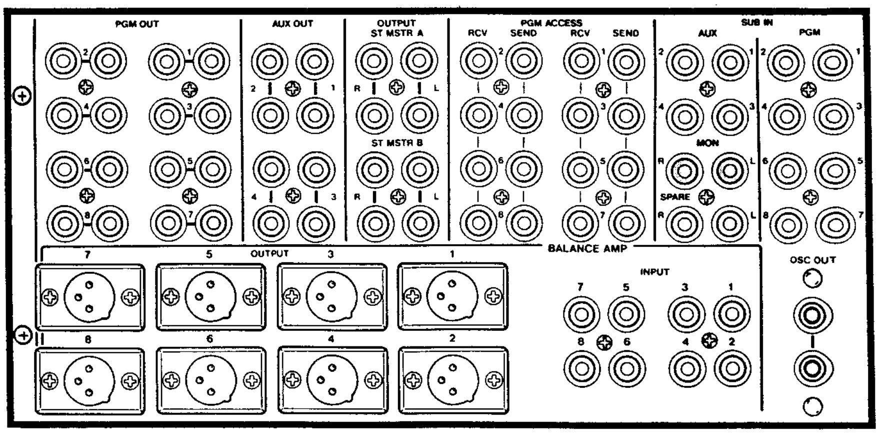
f. AUX 3, 4 Switch

Selects the AUX 3 and AUX 4 final mixes after the AUX 3 and 4 master faders. Essentially, this is a duplicate of the AUX 1, 2 switch, but for AUX mixes 3 and 4.

These two switches (AUX 1, 2 and AUX 3, 4) are basic multitrack necessities. And, when any session that depends on a good *Cue* (headset) mix begins, either of these switches should be your first selection so you can listen to the *Cue* system balance, and set the rehearsal sound.

g. MONITOR MONO Switch

When the final format is *mono*, such as a radio spot, rather than force you to "center" all the MONitor PANs, we provide this switch. It will sum together both sides, left and right, of the stereo signal present in the MONITOR SELECT switch rack and will show you what your mix will sound like *BEFORE* it is broadcast. In stereo recording for disc release, it is useful to



know in advance what will happen when a stereo sound is combined to mono, even though no mono mix is planned. Remember that radio is often *mono*, and much difficulty with mics wired "out of phase" or effects return added to the mix unwisely can be avoided by listening to a *mono* in the monitor while you still have a chance to change the approach. Disc cutters don't like too much out of phase stereo, and this one error can be the major cause of disappointment with a test pressing. Since a cutting tip is not capable of moving in two directions at the same time, and since two loudspeakers are truly independent systems, you can get a teriffic sounding tape that makes a very poor record if you don't check for mono compatibility. What to listen for? A mix that doesn't loose most of it's high or low frequency content when you select mono.

Phase is a difficult subject and there are no simple repairs that we can guarantee. You will have to experiment to find solutions one at a time. Moving the mic 1/2 inch may change everything.

Using the PHASE Reverse switch may also help solve this type of problem.

h. MONO LED Indicator

This LED is provided to remind you that the MONITOR MONO switch is on.

41. Monitor Buffer Amp

Isolates the MONITOR from the multiple connections that follows.

42. Headphones Volume Control

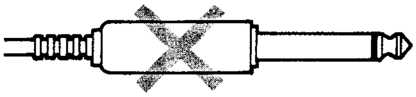
This rotary control will allow independent adjutment of the headphone volume.

43. Headphones Tip-Ring-Sleeve Stereo Output Jack

Use only stereo phones!

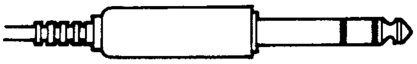
CAUTION! MONO (2 WIRE) HEADPHONES WILL CAUSE EVENTUAL CIRCUIT FAILURE.

If your "phones" have this connector, *DON'T* use them.

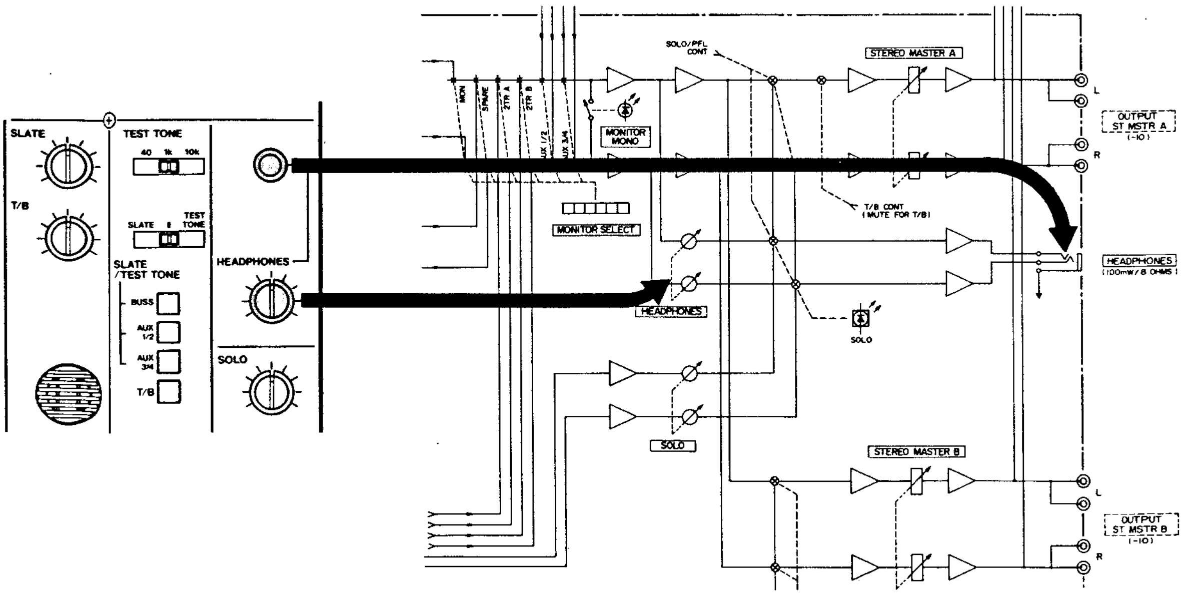


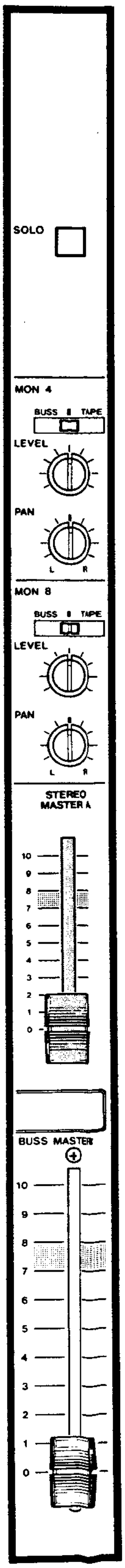
(1/4" phone 2 section connector)

To be safe, the headset connector must have three sections. We realize that in any patchable system, accidents can happen. We do build protection circuits in to assure that a momentary mis-connection will not cause instant failure, but just because the circuit seems to work OK when you try it for a moment or two, don't assume that it will work forever. Sooner or later, it *WILL* fail (2 to 3 minutes). The reason? When the "sleeve" of the 2 wire phone jack is inserted, it will connect *both* outputs together "head to head" and this is not a usable signal combining method.



(1/4" phone 3 section connector)


SLATE
TEST TONE
40 1k 10k
T/B
SLATE TEST TONE
SLATE /TEST TONE
BUSS
AUX 1/2
AUX 3/4
T/B
HEADPHONES
SOLO
MON
SPARE
2TR A
2TR B
AUX 1/2
AUX 3/4
SOLO/PFL CONT
MONITOR MONO
MONITOR SELECT
HEADPHONES
SOLO
STEREO MASTER A
T/B CONT (MUTE FOR T/B)
SOLO
STEREO MASTER B
L
R
OUTPUT ST MSTR A (-10)
HEADPHONES (100mW/8 OHMS)
L
R
OUTPUT ST MSTR B (-10)


SOLO
MON A
BUSS TAPE
LEVEL
PAN
L R
MON B
BUSS TAPE
LEVEL
PAN
L R
STEREO MASTER A
10
9
8
7
6
5
4
3
2
1
0
BUSS MASTER
10
9
8
7
6
5
4
3
2
1
0

44. Stereo Master Faders, A&B

Each *dual* slide fader (stereo) adjusts the overall level of the signals selected at the MONITOR SELECT switch rack. The signal level apearing at the ST MSTR A OUTPUTs L/R is determined by the STEREO MASTER A fader while the STEREO MASTER B fader determines the signal level appearing at the ST MSTR B OUTPUTs L/R.

45. Monitor Buffer Amp

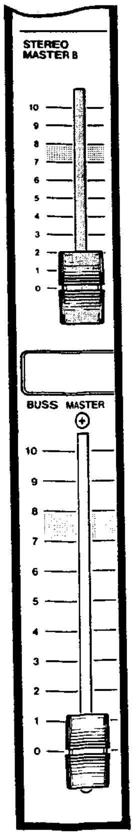
For signal isolation.

46. ST MSTR A Output L/R RCA Jacks

The expected use of this output pair is to send signal to a power amp and loudspeakers for control room monitoring. Output from the SOLO and PFL system will appear here.

47. ST MSTR B Output L/R RCA Jacks

Because output from the SOLO and PFL systems *does not* appear at this output pair, it may be used as either a studio feed or in conjunction with the balanced output amplifier as a broadcast clean feed, or as a secondary recording buss.



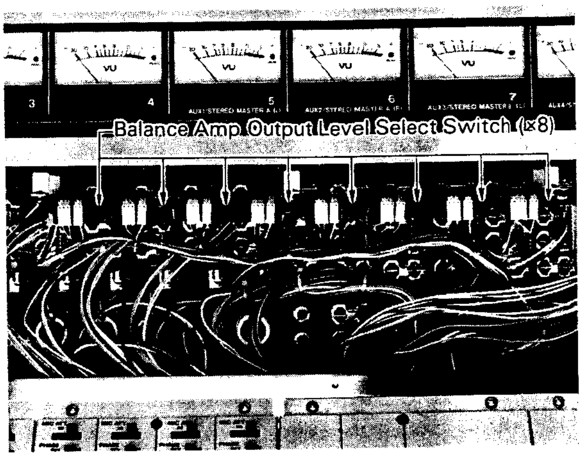
STEREO MASTER B
10
9
8
7
6
5
4
3
2
1
0
BUSS MASTER
10
9
8
7
6
5
4
3
2
1
0

48. +4/+8 Balance Amp Output Connectors 1 through 8

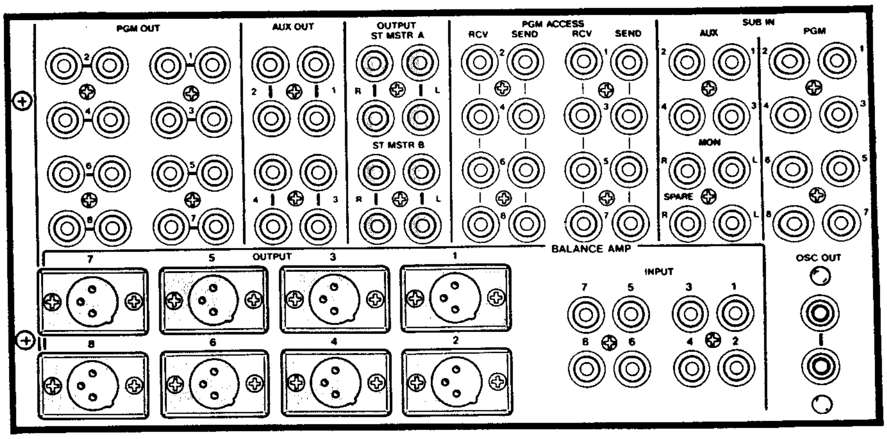
This set of 8 outputs can be patched to convert any of the console's −10 dBV unbalanced output jacks to balanced, transformerless, +4 or +8 dBm outputs. The availability of these low impedance, balanced outputs is essential whenever long lines are to be run without high frequency signal loss or susceptibility to hum and interference. Signal may be patched into these outputs by means of the BALANCE AMP INPUT 1 through 8 RCA connectors adjacent to the balanced XLR connectors on the rear panel. These jacks may be used for the 8 mixing busses (PGM OUT 1 through 8), for a pair of stereo outputs (ST MSTR A & B, L/R) plus the mono AUX mixes (AUX 1 through AUX 4), or any of the console outputs. In fact, these jacks can even be used for balancing the output of external line level devices (−10 dBV nominal level) such as the output of a reverb or compressor.

Switches are provided on the PC Board in the panel to set the nominal "0 VU" reference to either +4 dBm or +8 dBm.

Remove four screws (in M-512, six screws in M-520) located on front panel beneath meter bridge, then tilt the rear panel by pushing back meter bridge, so you will see these switches. (See photograph below.)



VU
3
4
5
6
7
Balance Amp Output Level Select Switch (x8)



PGM OUT
AUX OUT
OUTPUT
ST MSTR A
ST MSTR B
PGM ACCESS
RCV
SEND
SUB IN
AUX
PGM
MON
SPARE
R
L
BALANCE AMP
OUTPUT
INPUT
OSC OUT
1
2
3
4
5
6
7
8

TALKBACK SECTION

49. Talkback Mic

A talkback mic is built-in, and the switches and volume controls that follow will assign it to several outputs.

50. Slate Volume Control

Controls the level of the Talkback Mic to the BUSS, AUX 1/2, and AUX 3/4 assign switches in the SLATE/TEST TONE select switch rack.

51. Slate/I(OFF)/Test Tone Switch

This switch has three positions and affects the output from the test tone oscillator and talkback mic.

a. Set left – SLATE
The talkback mic is now made available to the BUSS, AUX 1/2 and AUX 3/4 switches in the SLATE/TEST TONE select switch rack. The test tone oscillator output is not available.

b. Set Center – I (OFF)
Both the talkback mic and test tone oscillator output are not available.

c. Set Right – TEST TONE
Output from the test tone oscillator is now made available to the OSC OUTs on the rear panel and SLATE/TEST TONE select switch rack.

52. Talkback Volume Control

Controls the level of the talkback mic exclusively to the T/B (Talkback) switch in the SLATE/TEST TONE select switch rack.

53. Test Tone Signal Select Switch

This three position switch will select the following frequencies:

a. Set Left – 40 Hz
This tone is useful for high speed search.

b. Set Center – 1k Hz (1000 Hz)
The basic set-up frequency, and the only correct one for aligning a dbx* unit without causing action of the noise reduction circuit.

c. Set Right – 10k Hz (10,000 Hz)
This is the standard alignment frequency that you should put on your masters if you are planning on making records. Thirty seconds of this frequency will allow the cutting room engineer to align the master recorder's playback azimuth to the same standard as your master machine, and you will retain good high frequency performance.

*dbx is the registerred trademark of dbx Inc.

54. Slate/Test Tone Select Switch Rack

There are four switches in the rack.

a. BUSS Switch
When depressed, if the TEST TONE/ I (OFF)/ SLATE switch is in the SLATE position, signal from the built-in talkback mic will be made available to all eight BUSS (PGM) OUTs. And if the TEST TONE/ I (OFF)/SLATE switch is in the TEST TONE position, output from the test tone oscillator will then be presented to all eight BUSS (PGM) OUTs and meter circuit for system calibration and tone-stripping your tapes.

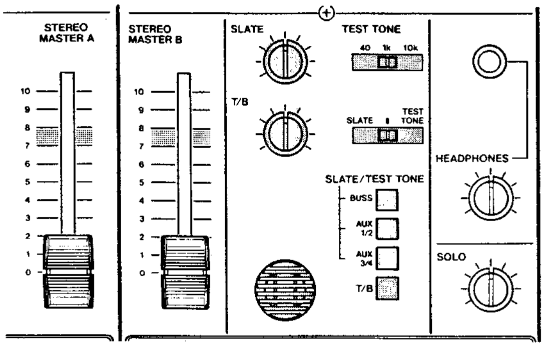
b. AUX 1/2 switch
When depressed, if the TEST TONE/ I (OFF)/ SLATE switch is in the SLATE position, signal from the built-in talkback mic will be made available to the AUX 1, 2 OUTs. And if the TEST TONE/ I (OFF)/SLATE switch is in the TEST TONE position, output from the test tone oscillator will then be presented to the AUX 1, 2 circuit.

c. AUX 3/4 switch
When depressed, if the TEST TONE/ I (OFF)/ SLATE switch is in the SLATE position, signal from the built-in talkback mic will made available to the AUX 3, 4 OUTs. And if the TEST TONE/ I (OFF)/SLATE switch is in the TEST TONE position, output from the test tone oscillator will then be presented to the AUX 3, 4 circuit.

d. TALKBACK Switch
When depressed, the Talkback Mic is assigned to the ST MSTR B OUTPUTs L&R.

55. OSC Out RCA Jacks

This parallelled output allows access to the TEST TONE signal so it can be patched as required when the TEST TONE/ I (OFF)/SLATE switch is in the TEST TONE position.



We have now reviewed and described every control and control route on the console. In the next section of this manual, you will find some suggestions for basic system layouts that make use of the controls.

PATCH INTRO

The standard patching setups described here are provided with the hope that they will stimulate your imagination when you have mixing needs that cannot be solved with a standard setup. Line level is line level, whatever the source, and the many line level inputs on the console can offer solutions to your specific problems that we have not addressed directly with a dedicated top panel control or subsystem. Patching should be used to optimize the quality of your signal by bypassing unneeded controls or by making additional control possible.

Most people tend to look for permanent connections in order to reduce complex patching logic to something that can be dealt with "under pressure." It is true that the logic of the control functions on the top panel takes some time to become familiar with, but multichannel production has many mixing requirements. A *permanent patch* will severely restrict flexibility. If you can learn to examine the system with re-patching in mind, you can achieve significant improvements in system performance. For this reason, we suggest that you plan on access to the back panel of the mixer. Don't set up your system in such a way that you "hide all that mess" and have no access to the back panel. Leave yourself room to get at all the connectors. You will need all the options you can get.

After you have made several patches you may find that the top panel labels are no longer correct, and so we strongly suggest that you take the time to re-label each control to correspond to the new function that your re-patch is controlling. Drafting tape labels applied to each control or group will prevent accidents from happening because you have tried to operate the mixer "normally."

It is also wise to label both ends of every cable. When repatching away from "normal", a label will save endless tracing and re-tracing of the wiring.

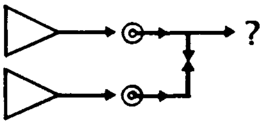
In all patching and connecting of two-wire single ended circuits, some basic rules are worth mentioning:

1. Keep your cable runs *SHORT!* – as short as possible.

   Installing a patch bay behind the engineers chair will require at least 20 foot runs out and back and is not recommended. Mounting the patch bay on the left or right side of your mixer will allow much shorter runs, and wisest of all is to us our PB-64 Patch Bay accessory mounted on top of the meter bridge itself. This location will permit the use of the shortest lengths of cable, and will improve your sound. Incidentally, short runs cost less so you will save money as well.

   The use of "professional" 3-conductor cable such as Belden 8451 should be avoided. Even though it is of excellent quality, it is not the right idea for 2-wire transformerless systems. If you are going to make up your own cables, we would suggest that you consider TASCAM low loss professional audio cable in the 500 foot rolls, or, cable such as Belden 8218. Solid core insulation and low capacitance are the important considerations in the 2-wire system. Some low capacitance cable uses soft foam insulation and is also not recommended as the center conductor will cut through the soft foam with time and the cable will short circuit. Don't use it.

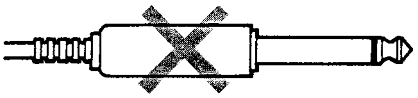
   TASCAM low loss, professional audio cable has less than 15 pF per foot of capacitance and uses a very durable material for its insulator. In the "made up" lengths we offer, the connector is a heavy duty RCA jack made of steel that will stand up to the demands of constant patching and re-patching without breaking down.
2. Multiple output connections always require impedance matching calculations. Make sure you are not asking too much of your output stages. Permanently connecting several cables to a single output may produce poor quality. Be certain that a multiple connection is well within safe limits. Use the section on impedance calculations in this manual, abide by the rules for 2-wire circuits we have discussed, and you will get better results.
3. Using a "Y" cable to "sum" or join two outputs in order to feed one input *WILL NOT BE POSSIBLE*. Since there is no "one way" sign on a wire, signal from one side of the "Y" will flow back into the other side as well as on to the input of the next device. Summing, or adding two signals together requires that they be properly isolated. A simple joining together of the "hot" leads will not work.



Look's OK ... but circuits are output to output. No good.

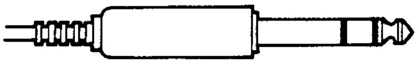
We recognize the fact that with a patchable system, accidents will occur. We have built protection circuits in to insure that a momentary mis-connection will not cause instant failure, but – just because it seems to function when you try it for a moment or two, don't assume that it will work forever. Sooner or later it *WILL* fail (2 to 3 minutes) and it is definately not a usable method of expanding mixer flexibility.

When using the STEREO HEADPHONE circuit on the console, a similar caution applies. The use of *MONO* headphones will cause circuit failure. If your "phones" have this connector, *don't* use them.



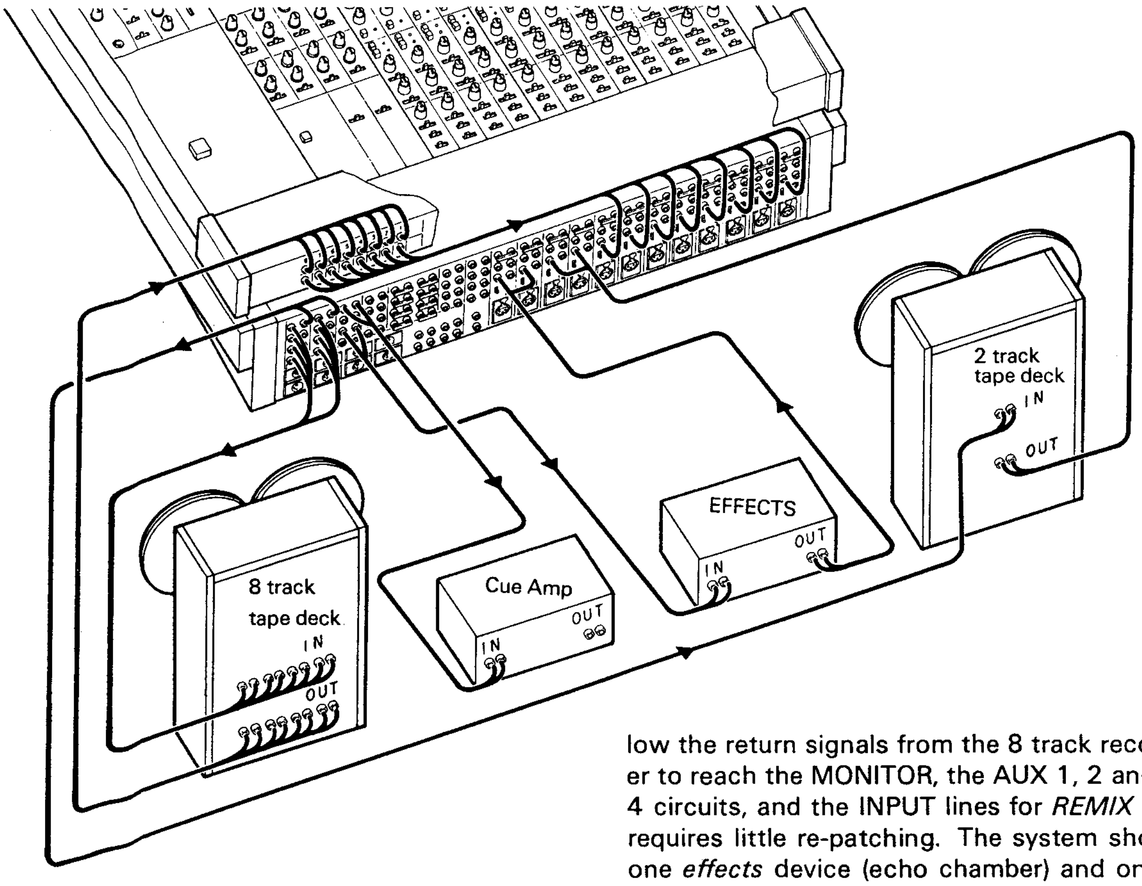
(1/4" phone 2 section connector)

The "sleeve" of the 2 section plug will connect both sides of the stereo headphone amplifier together in the "head to head" mode. To avoid this, you must have *THREE* bands on the plug. It is also a good idea to check the wiring to make sure that the three sections are actually wired individually. Look for this discrete configuration when you unscrew the protective cover on the connector.



(1/4" phone 3 section connector)

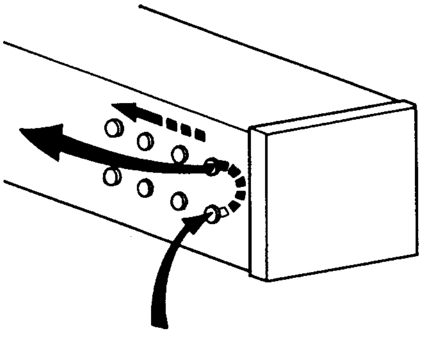
RECOMMENDED 8 TRACK BASIC PATCH



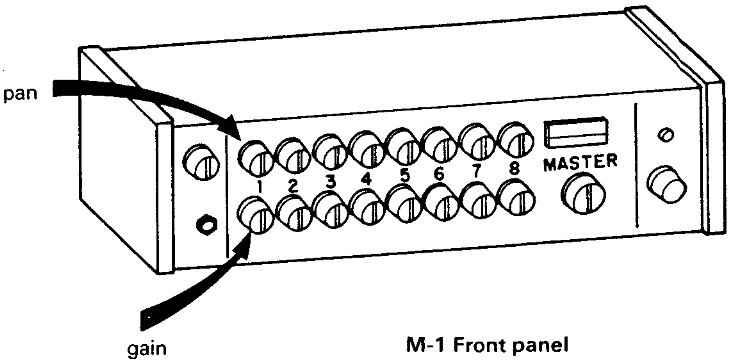
This patch makes use of the multiple function TAPE IN on *Input Channels* 1 through 8 to allow the return signals from the 8 track recorder to reach the MONITOR, the AUX 1, 2 and 3, 4 circuits, and the INPUT lines for *REMIX* and requires little re-patching. The system shows one *effects* device (echo chamber) and one 2 track recorder, and is the basic system most applications will require for 8 track production.

EXPANDING SECONDARY FUNCTIONS WITH THE MODEL 1

Although the console has four separate mono AUX circuits, there are times in multitrack production when another separate stereo mix may be required in addition to the AUX mixes. Here, we show the location of the available outputs that can be used to feed an *accessory mixer* from the M-512 or M-520, and the possible uses for which each patch point is best suited. For each application, we suggest a method of return to the appropriate "mix" so the expansion can be included in the process. First, lets examine the back panel of the M-1, so you can understand the "pass through" method that allows the use of the signal in more than one M-1, or to continue an important feed to a second location.



M-1 Rear panel



M-1 Front panel

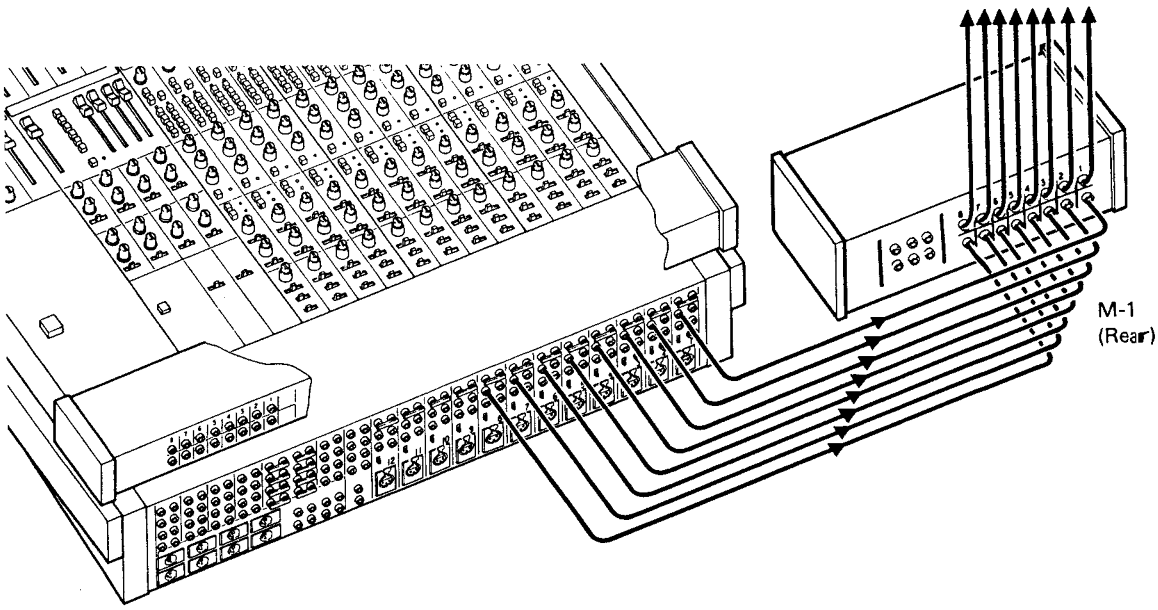
On the back panel of the M-512 or M-520 there are three places that allow the addition of M-1s and each jack can drive two without loss of signal quality.

1. Direct Out

This source of signal is *POST* fader and EQ. The M-1 will allow you to use *all four AUX* mixes.

To monitor these mixes, we connect the M-1 outputs to the SPARE SUB IN on the console that can be assigned to the MONITOR. This connection will allow you to hear what signal balance is present in this mix *before* it is sent to the effect.

DIRECT OUT
as source
allows further
use of unmixed signal

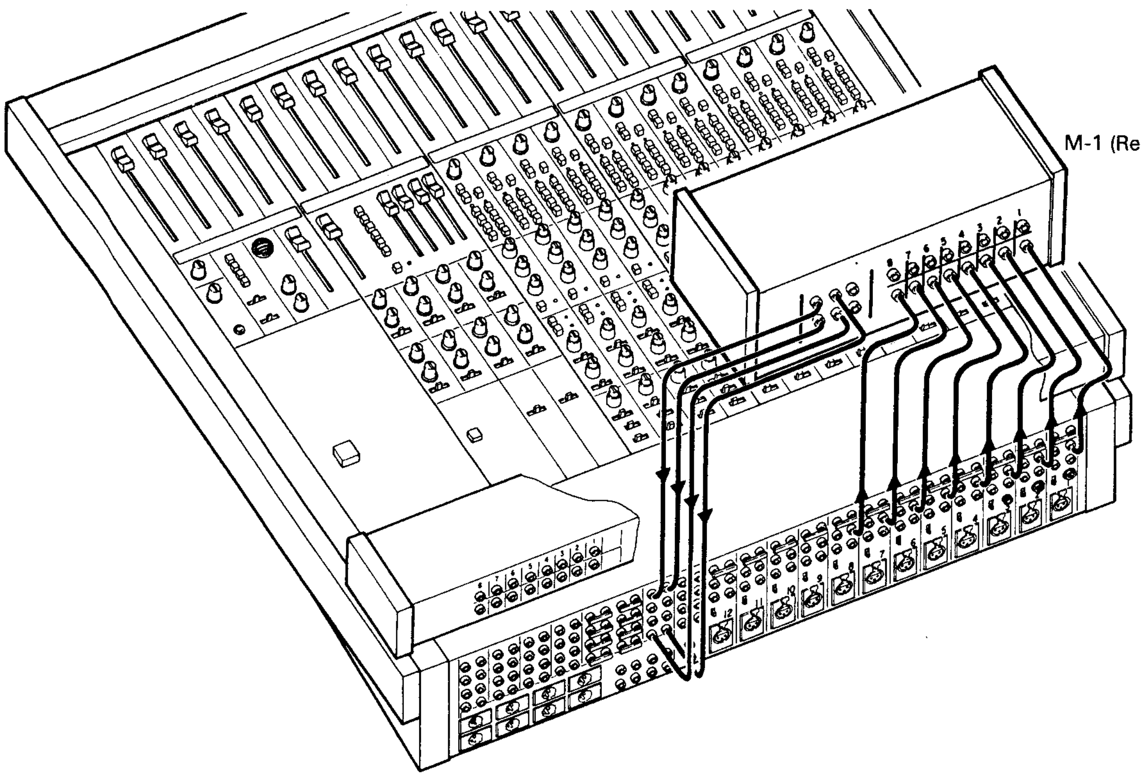


2. Extra ACCESS SEND (I; Pre Out)

Using this connection will provide a second source for pre-fader signals. A possible use for these connections might be this: because the AUX 1, 2 and 3, 4 systems may be needed to *CUE* tape returns in 8 track production, a *CUE* of MIC signals in these *Input Channels* will not be available. Adding a M-1 via this output will give you 8 x 2 submix to add to the AUX buss that has the CUE system job.

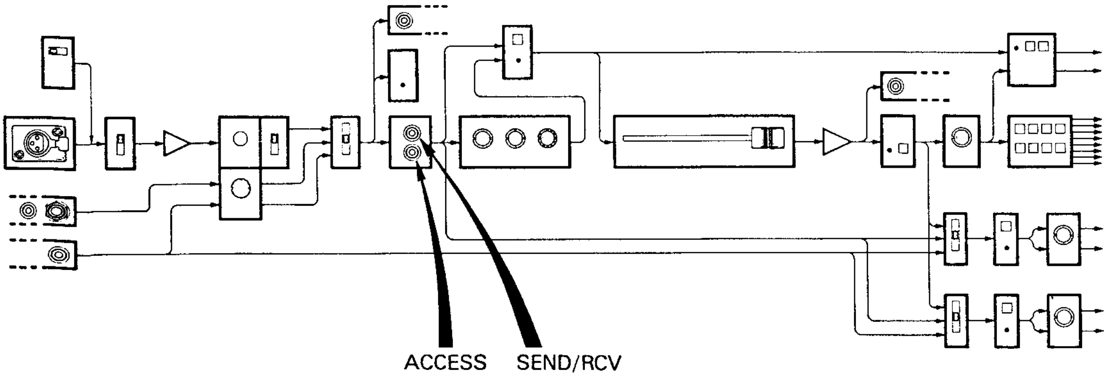
Use the AUX SUB IN patch point to add the M-1.

To add the M-1 to your AUX Buss CUE system, simply patch into that AUX SUB inputs.



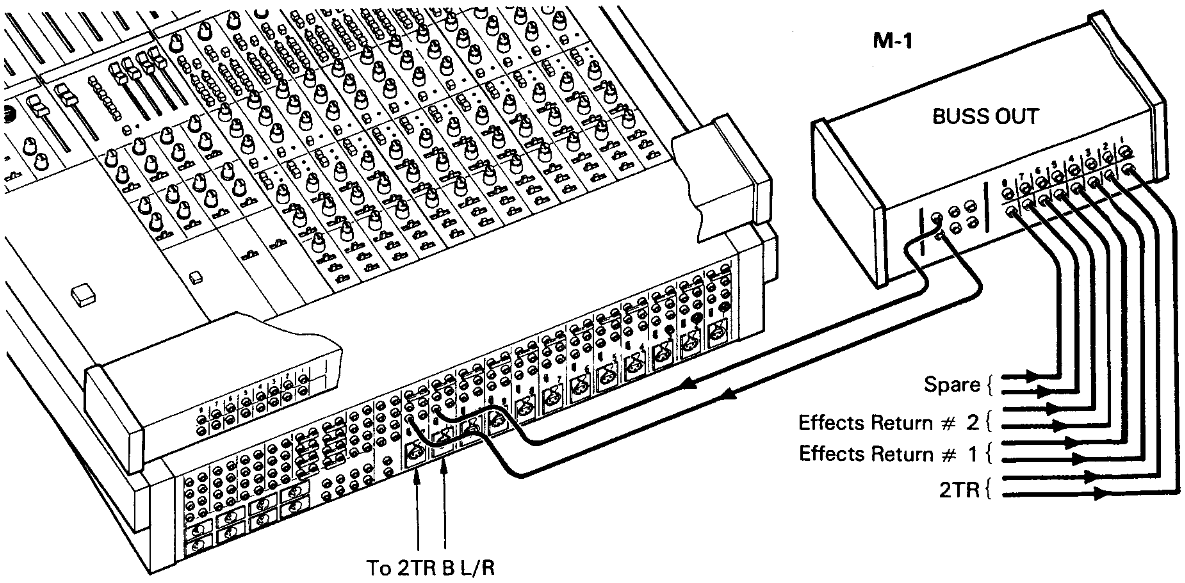
3. ACCESS SEND/RCV

This point is usable as an additional patch for a Model 1 if the "pass through" style of connection is used, but since it is the same signal point as the ACCESS SEND (I), we suggest that you use this extra one instead. If your requirements for extra subsystems exceed the two per output that we consider safe, then use this patch to safety expand your subsystems.



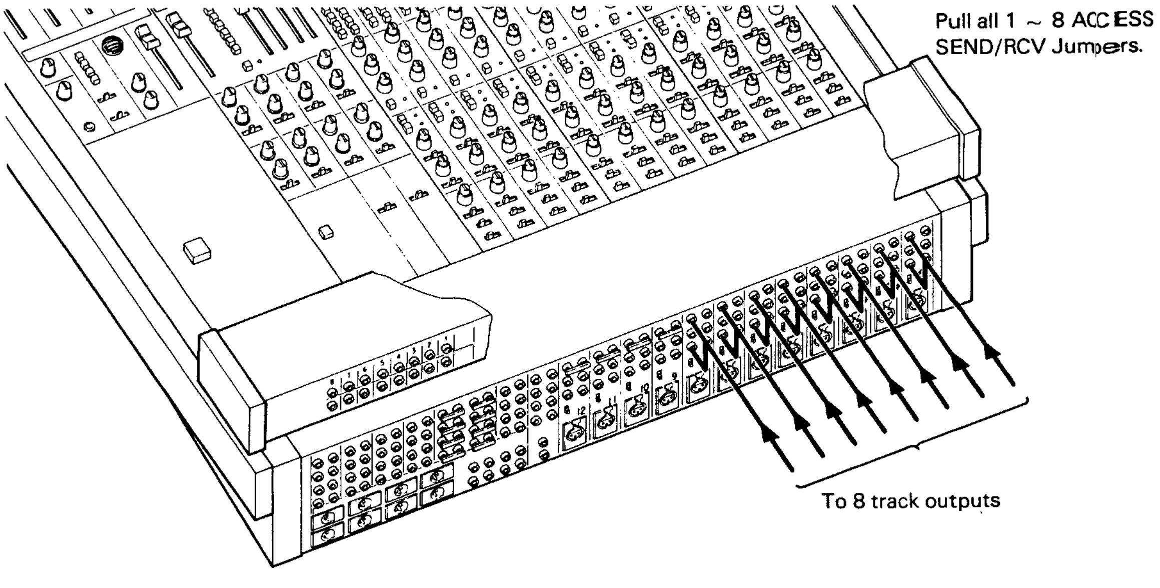
4. Expanding the 2 Track Return Inputs

Occasions may arise where the switch selection of this pair of *Input Channels* needs to accept more inputs than the possibilities we provide. Connect a Model 1 to the TAPE INs and then you will be able to select 4 possible stereo sources instead of one. Route them to the busses for recording or to the MONITOR for listening.



MINIMUM LOSS PATCH FOR MAXIMUM QUALITY IN MIXDOWN

Since *ALL* the line level controls on the *Input Channels* appear after the ACCESS SEND/RCV jacks, the ACCESS RCV jacks may be used as a line level input in order to bypass the first amplifier in the console. Bypassing amps wherever possible improves signal quality. The functions lost are the OVERLOAD indicator, use of the TRIM. Most of these functions may not be needed in mixdown, but if you consider PREFADER a necessary part of your mix, use a "Y" adapter and plug in one section to ACCESS RCV and the other to TAPE IN, and you will have the benefit of bypassing the input preamplifier without losing any function except the TRIM. With this arrangement, the TRIM will adjust only the TAPE IN signal to the AUX 1, 2 & 3, 4 (signal select switch) systems. This separation may prove useful.

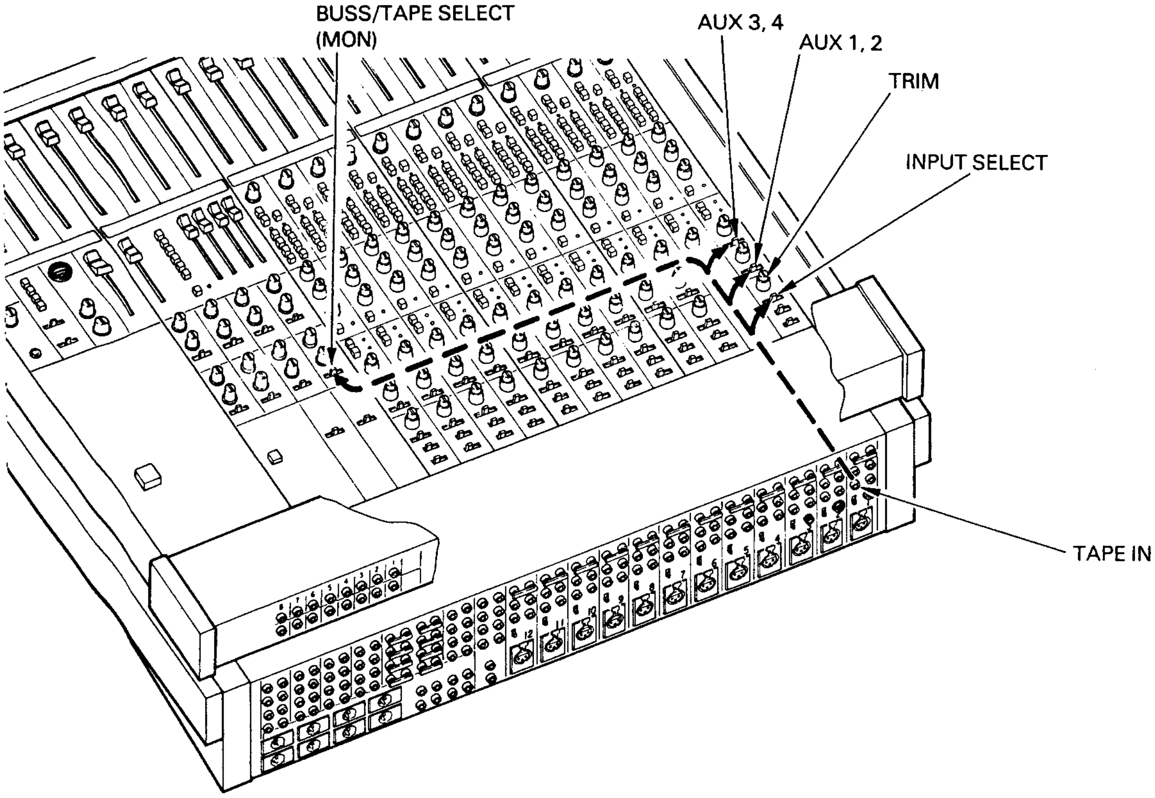


WORKING METHODS FOR THE M-512 OR M-520

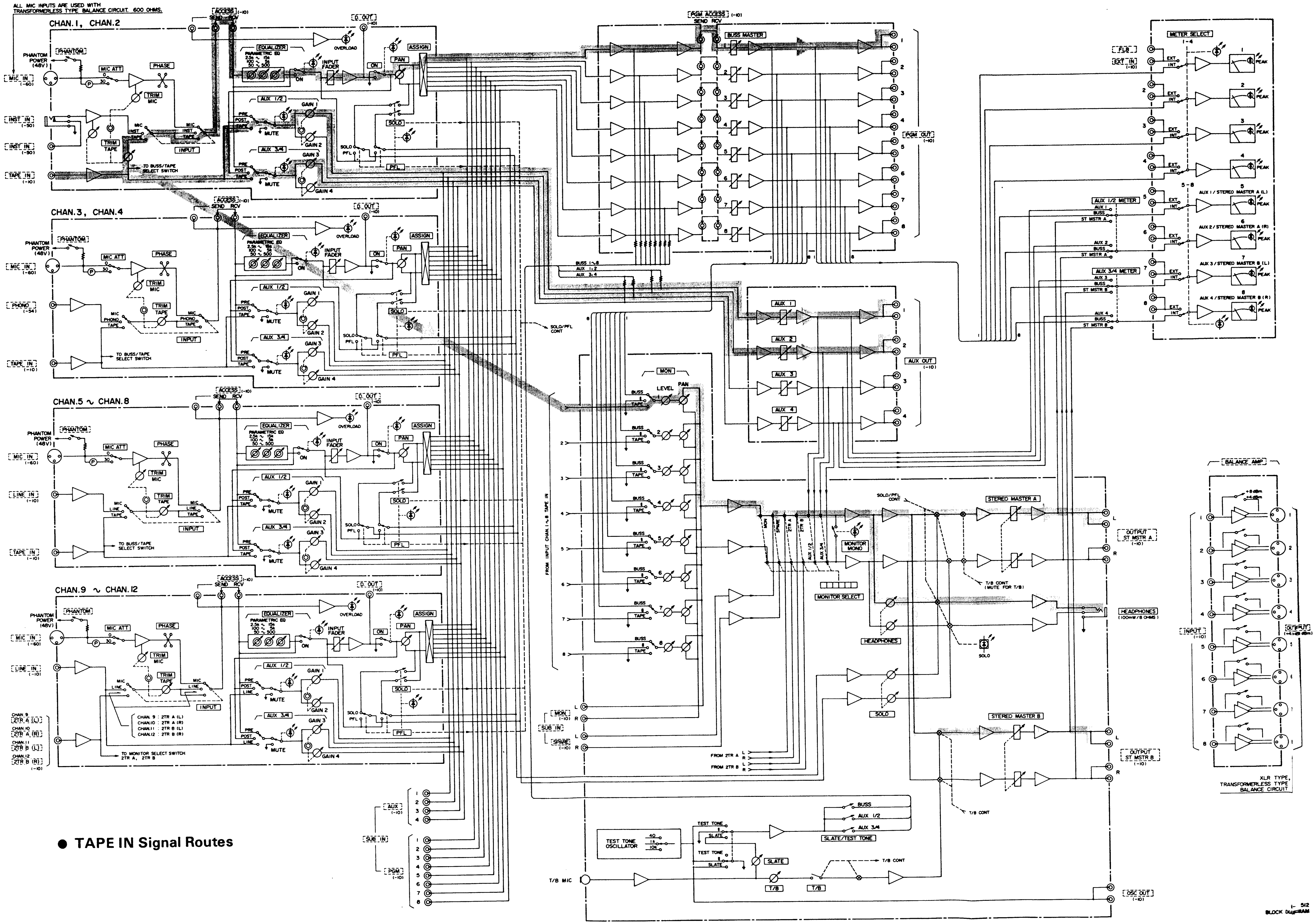
Now that we have explained the available input signals, the switches and jacks, we can discuss the jobs.
We assume that any multichannel recorder has only one set of playback outputs. We will have at least three basic jobs to do that will use the playback signal:

1. Simple playback to judge a performance, requiring no corrective EQ. In short, what did you record?
2. Simple playback into a cueing system so partially completed tapes can be finished. This function should somehow combine the playback signals with "new" mic signals so musicians may hear a balance of both when overdubbing.
3. Final remix, when the full control capability of the system (EQ, effects, etc) can be used to "fine tune" the completed multichannel master.

Three basic tasks. One playback tape signal. To avoid resetting all the controls on the *Input Channels* and loosing the EQ and record level settings that have taken much time to get "just right" every time you change from record to play, you use the multi-purpose TAPE INPUTs instead of the LINE INPUTs. A perspective drawing may help you to visualize the routing. We show one channel only so the wiring can be seen clearly.



All these "routes" can be active at the same time. The *Block Diagram* shows all four systems. Since the size of the page in this manual forces us to reduce the *Block Diagram* a lot, we suggest that you use this block as an index in order to find the area we are discussing on the large separated version which will be easier to read.
Now that we have the signal routed to the right places, we'll keep going and use some more drawings to show you the rest of the signal pathway for each job.


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
PHANTOM POWER (48V)
MIC IN (-60)
INST IN (-50)
TAPE IN (-10)
PHONO (-34)
LINE IN (-10)
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
INPUT
TO BUSS/TAPE SELECT SWITCH
ACCESS SEND RCV (-10)
D. OUT (-10)
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
PAN
ASSIGN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
MUTE
SOLO
PFL
PRE
POST
TAPE
TO MONITOR SELECT SWITCH 2TR A, 2TR B
CHAN. 9 : 2TR A (L)
CHAN.10 : 2TR A (R)
CHAN.11 : 2TR B (L)
CHAN.12 : 2TR B (R)
PGM ACCESS SEND RCV (-10)
BUSS MASTER
PGM OUT (-10)
AUX OUT (-10)
AUX 1
AUX 2
AUX 3
AUX 4
MON
LEVEL
BUSS
SOLO/PFL CONT
FROM INPUT CHAN 1~8 TAPE IN
MONITOR MONO
MONITOR SELECT
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B (-10)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
T/B CONT (MUTE FOR T/B)
FROM 2TR A
FROM 2TR B
MON (-10)
SUB IN
SPARE (-10)
AUX (-10)
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
SLATE/TEST TONE
AUX 1/2
AUX 3/4
T/B MIC
T/B
OSC OUT (-10)
FLB
EXT IN (-10)
METER SELECT 1-4
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
ST MSTR A
ST MSTR B
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
BALANCE AMP
+8 dBm
+4 dBm
INPUT (-10)
OUTPUT (+4/+8 dBm)
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
BLOCK DIAGRAM

● **TAPE IN Signal Routes**

le Record Check

the three position MON BUSS/I(OFF)/ signal select switches to the rightmost on marked TAPE. The MONITOR mix will)e derived from TAPE IN instead of BUSS To finish this "route", depress the MON 1 in the MONITOR SELECT switch rack to signal out to power amps or headphones. engineers use this "Logic" for control monitor all the time. "Listening" to the recorder electronics solves the problem here is the signal coming from?" Never which output from the console is feeding eight, lets just listen to track eight, and on't have to remember under pressure ve "got there."

this monitor method, *any* line level e that carries a signal can be considered feed" to a track, even if it has no monitor ility on the way "out" of the console, be- you will be monitoring the "return", not end." Since many tracks in multichannel can be described as "one mic per track" ding, a little thought will show you that an record more tracks than you have OUTs if you use this method. Another tage of this "machine monitor" is that on't have to change *anything* to make a ack for the musicians, because you are *al-* listening to "playback." The "mix" that ave been working with will be what you the monitor when you rewind and play pe. We recommend this monitor method . It saves much time and eliminates con-

Cue System

To get either pair of AUX mixes (1 & 2 or 3 & 4) out of the console to the cue system power amp, some additional control decisions will be required.

To audition the sound of the AUX 1, 2 or 3, 4 mix in the control room, depress the appropriate signal select push switch (AUX 1, 2, AUX 3, 4) in the MONITOR SELECT switch rack. In setting the actual level for the players, caution is advised. The volume set by the master faders that feed the signal to the headphone power amps will not relate directly to the control room volume (which is set separately by the MON GAIN control) so take care.

As your multi-track master fills up and you use the AUX circuits in the TAPE position to cue the output of the recorder, you may not be able to cue the MIC INputs. A few solutions and some study may show the way:

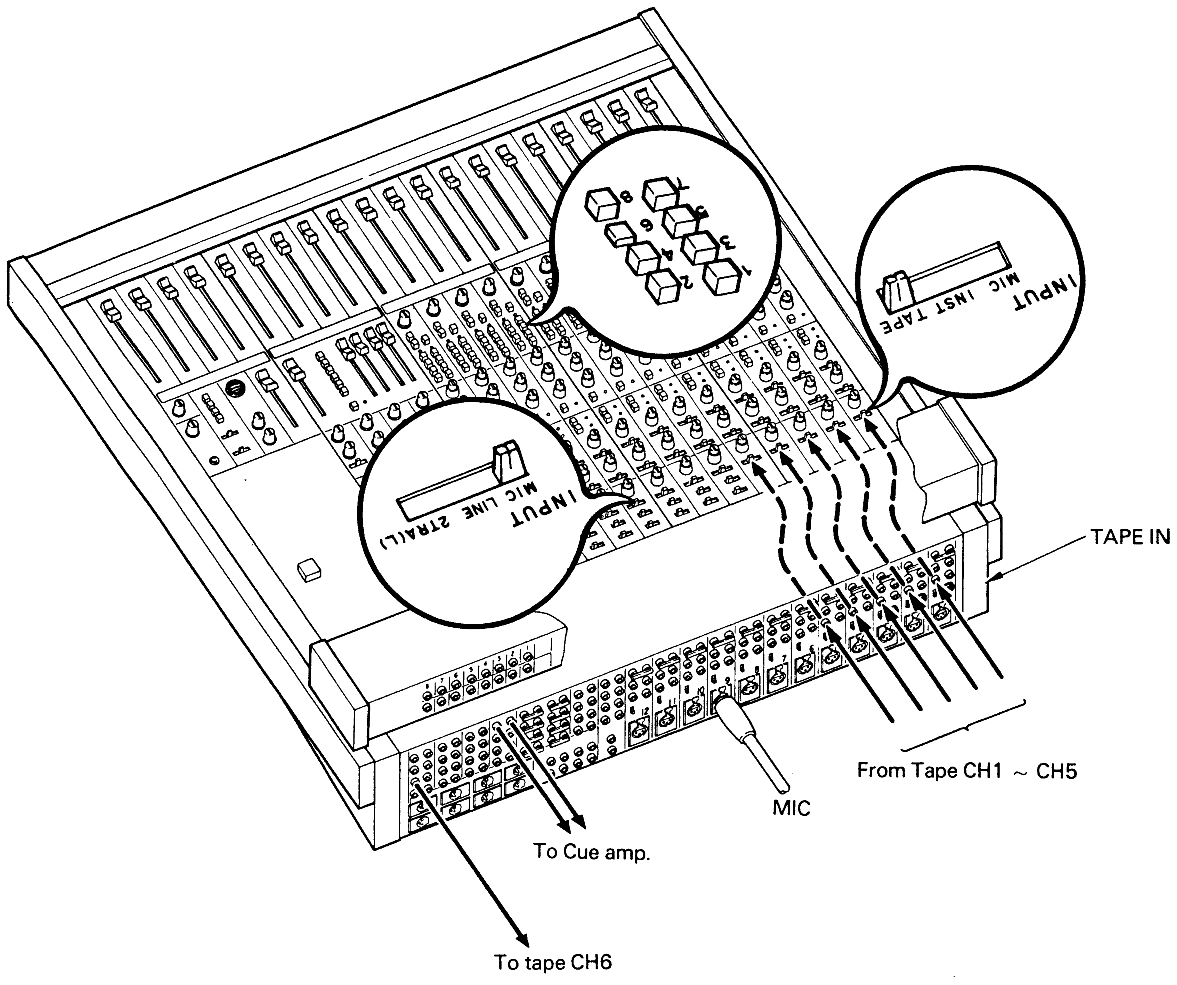
If you are making one mic overdubs, use the MIC INs on *the last Input Channels* and you will avoid the MIC-TAPE conflict altogether. (That is, if M-512 Channels 1 – 8 are used for 8-track tape return, use Channels 9 – 12 for mics. If M-520 Channels 1 – 16 are used for 16-track tape return, use Channels 17 – 20 for mics).

If you are working without effects, cascade the AUX 1 and AUX 2 outputs into the AUX SUB IN 3 and 4 inputs. With the AUX systems combined in this way, one section can cue the microphones while the other cues the recorder.

If you are working with effects and must use all MIC INs to record the last track, we have accessory mixers called M-1s that will add more knobs to your console for a small fraction of the price of the main chassis. We think that most users will seldom wind up needing all mic inputs to record that last track, but it does happen occasionally. Reviewing EXPANDING SECONDARY FUNCTIONS WITH THE MODEL 1 (page 37) will give you some ideas on how to solve the problem.

For a complete eight track working patch with full effects and cue details, refer to the RECOMMENDED 8 TRACK BASIC PATCH diagram and text located in the PATCH INTRO section of this manual.

Tape playback plus mic cueing for overdubs.



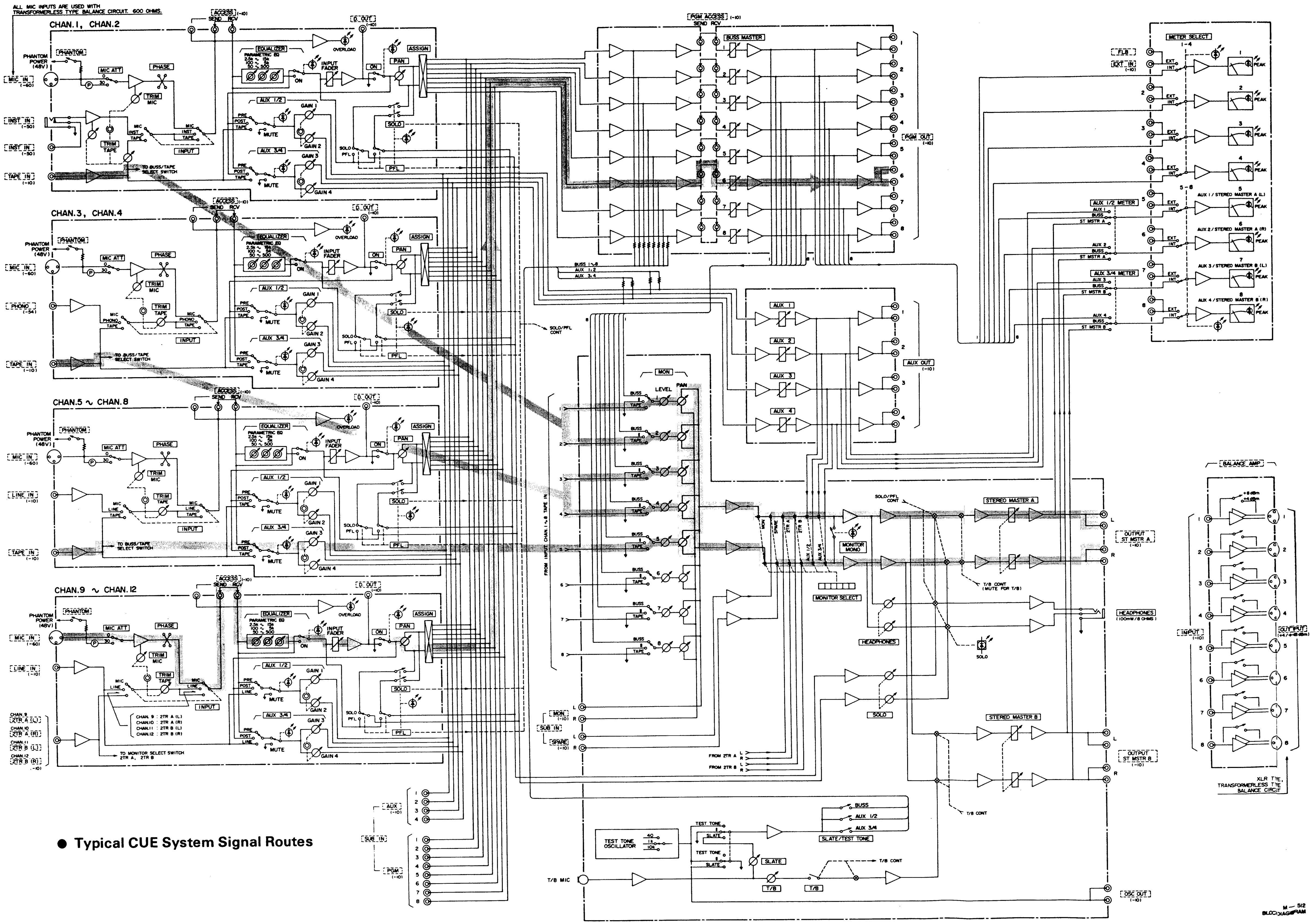
Calibration

"Calibration" simply means matching all the reference levels in your recording system to ensure that signals from one element in the system are equally interpreted by all the other elements in the system.

The built-in tone oscillator is ideal for calibrating your system, tracing out patches and getting levels set prior to recording. With it you can set reference levels, balance gain stages of components, and check overall system response.

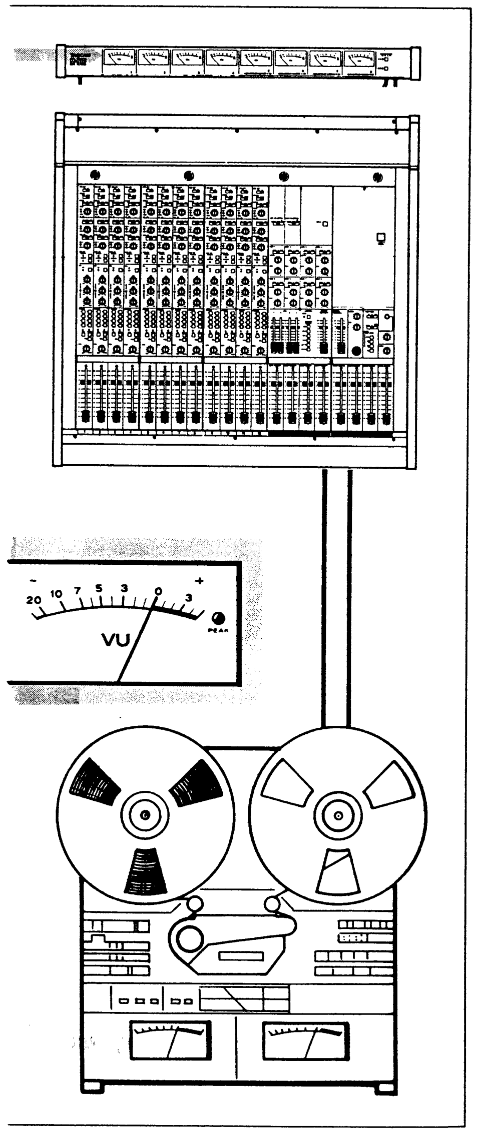
Setting the SLATE/I(OFF)/TEST TONE switch to the SLATE position, selecting the 1 kHz tone, and depressing the BUSS switch in the SLATE select switch rack, will apply the 1000 Hz tone to all 8 busses. A 0 VU buss output level can be obtained by reading the console meters and adjusting the BUSS MASTER faders accordingly.

You can use this calibrated tone to insure that your multichannel recorder is properly calibrated. That means "0 level in" equals "0 level out". Then, record one minute of the tone. Turn the tone oscillator off, select the TAPE position for the INPUT select switches on the corresponding *Input Channels*, and set their input faders to the shaded zone. Assign each *Input Channel* to an individual buss.


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN. 1, CHAN. 2
CHAN. 3, CHAN. 4
CHAN. 5 ~ CHAN. 8
CHAN. 9 ~ CHAN. 12
PHANTOM POWER (48V)
PHANTOM
MIC IN (-60)
INST IN (-50)
PHONO (-54)
LINE IN (-10)
TAPE IN (-10)
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
INPUT
TO BUSS/TAPE SELECT SWITCH
ACCESS (-10) SEND RCV
D. OUT (-10)
OVERLOAD
EQUALIZER
PARAMETRIC EQ
INPUT FADER
ON
PAN
ASSIGN
AUX 1/2
AUX 3/4
PRE POST TAPE
MUTE
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
CHAN. 9 : 2TR A (L)
CHAN. 10 : 2TR A (R)
CHAN. 11 : 2TR B (L)
CHAN. 12 : 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
PGM ACCESS (-10) SEND RCV
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1, 2
AUX 3, 4
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
SOLO/PFL CONT
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN. 1~8 TAPE IN
MONITOR SELECT
MONITOR MONO
STEREO MASTER A
OUTPUT ST MSTR A (-10)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
T/B CONT (MUTE FOR T/B)
STEREO MASTER B
OUTPUT ST MSTR B (-10)
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
SLATE/TEST TONE
BUSS
AUX 1/2
AUX 3/4
T/B CONT
T/B MIC
T/B
OSC OUT (-10)
METER SELECT 1-4
FLB
EXT IN (-10)
EXT INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
ST MSTR A
ST MSTR B
BALANCE AMP
INPUT (-10)
OUTPUT (+4/+8 dBm)
+8 dBm
+4 dBm
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
M-512 BLOCK DIAGRAM

● **Typical CUE System Signal Routes**

he tape of the 1 kHz tone and adjust the
TRIM controls for a "0" reading on the
le meters. Your mixer and recorder are
calibrated so you can make all subse-
record level adjustments from the mixer.
erm "dBV", by international agreement,
to 1 volt. Therefore, 0 dBV = 1 volt. The
le and all other TASCAM mixers and re-
rs reference dBV to 1 V with –10 dBV
6 V) corresponding to a TASCAM meter
ng of 0VU. If the equipment you are using
nces dB to 0.775 V rather than 1 V (i.e.,
or 0 dBm in a 600 ohm circuit), a correc-
actor of +2.2 dB (or VU) will have to be
to compensate for the difference; i.e. 0
TASCAM +10 VU) = 1.0 volt = +2.2 dBu,
0 dBV (TASCAM 0 VU) = 0.316 V = –7.8



REMIX (*Tape*)

When an INPUT select switch (on any but the last 4 channels) is set to its rightmost position (TAPE), the channel's TAPE IN jack provides the mixer's full control capability (EQ, effects, mixing, etc.) for final *Remix* or fine tuning of the output of the corresponding track of the multichannel recorder. Lets assume you have plugged the recorder's outputs into correspondingly numbered console input channels 1 – 4 would be switched to TAPE for a 4-track tape, or channels 1 – 8 for an 8-track tape. In the M-520, channels 1 – 16 would be switched to TAPE for a 16-track tape.

Selecting *Tape* will not disable the functions of cue and monitor that we have discussed in the two prior sections. TAPE IN signal will be available to the AUX 1 through 4 mixes, the MONITOR mix and input channel EQ/PAN/BUSS ASSIGN function at the same time. There are several advantage offered by this multiple feed that are added to the necessary cue and monitor functions. With *Tape* selected, the cue function is not needed, so those AUX mixes can be used instead as an extra effects send.

During the course of normal multitrack production, a good "take" may be acceptable in every way except one: some doubt may arise as to the "mixability" of one track.

Since the *Remix* function may be selected one channel at a time, a single track may be routed through the EQ section and a correction tried out to make sure that re-recording is not required. This checkout will only require the readjustment of one channel. Many other consoles force you to switch the whole system to *Remix* just to check one channel.

Effects Return Method

Use the *Input Channels* that don't have mics plugged in. Much of multitrack production is done on a "one mic per track" basis and will leave you with unused *Input Channels.* You can take advantage of the functions that they provide to do things to the return signal. Separate EQ can be used to improve the "sound" of the effect. The AUX 1 through 4 outputs can be used to feed one device per jack and the remaining "spare" *Input Channels* (whose quantity depends on the number of tracks in the recorder and whether you have the M-512 or M-520 console) can be used to independently control the selection and balance of each signal returned. This method is not restricted to the "one mic per track" jobs. Even *stereo* returns, is possible.

This approach works because there should always be at least 4 "unused" channels (assuming an 8-track recorder with the M-512 or a 16-track with the M-520 console); there may be as many as 16 "unused" channels if a 4-track recorder is used with the M-520.

A Caution

These complex patches can lead to a circular assignment, or *FEEDBACK LOOP.* To use these setups successfully, the AUX MUTE on the "effects return" *Input Channels* should be depressed (muted), or, the AUX 1, 2 & 3, 4 signal select switches on the "effects return" *Input Channels* must not be set to PRE or POST. Make sure that you don't assign the processed signal return *BACK OUT TO THE EFFECTS DEVICE* by accident.

A Word or Two of Reality

The first time user may say, at this point, that these "extras" are *so hard to grasp* that the benefits are not worth the risks ... or the effort. The M-512 and M-520 are new. There are what seem like a thousand knobs, and the manual, at first, seems to be describing logistics that are so sophisticated that they only make sense to a "pro" 20 year's experience.

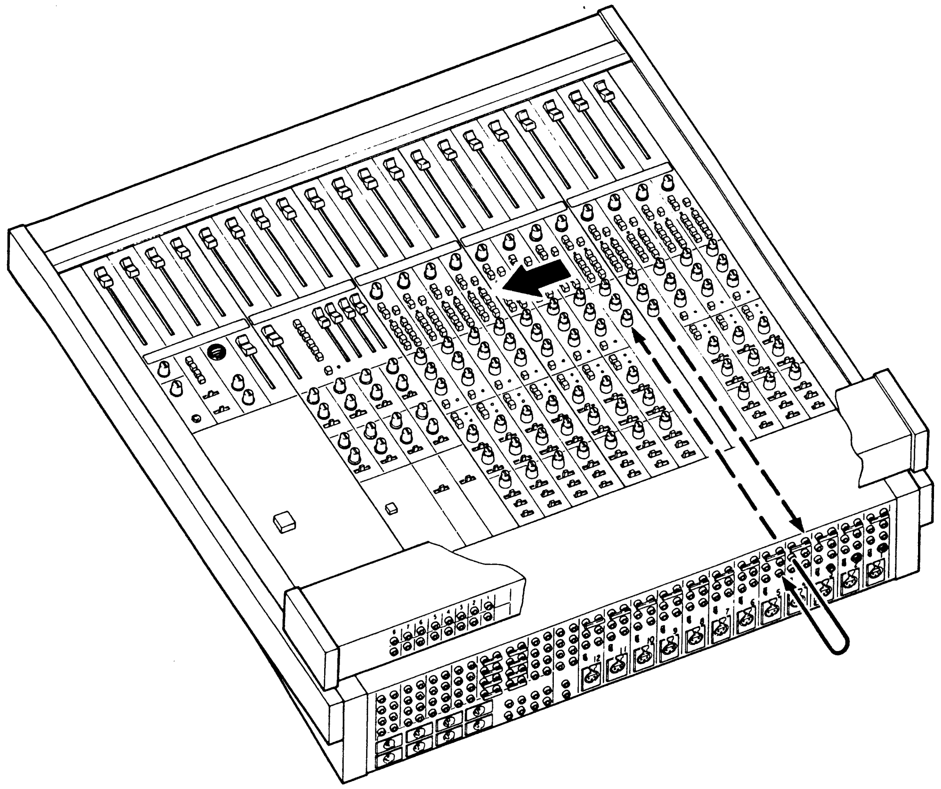
WE AGREE! These mix patches *are* complex and their routing is not easy to visualize. We will not insult your intelligence by saying otherwise. The M-512 and M-520 are Tools, not a toys. Like any good tool, good results depend on practice and understanding. You will find a use for the more "deluxe patches" when your art is in need of the control that they can provide.

Using Two Channels For More EQ

Because of the adjustable frequency point provided by a sweep control, the use of more than one *Input Channel* on a single sound offers a benefit that is not possible with a "set" point equalizer. On difficult signals such as electric bass or voice work in commercials or sound tracks, you can set the lower section of each dual concentric (frequency select point) to a different point in the frequency range and get six *different* boost or cut points instead of just an increase in the amount of adjustment.

Here's how.

Patch from the DIRECT OUT of one channel to the spare LINE IN of an unused channel and then use the assign buttons or the DIRECT OUT on the second (final) channel to go on.



Pre & Post EQ When Using A Limiter

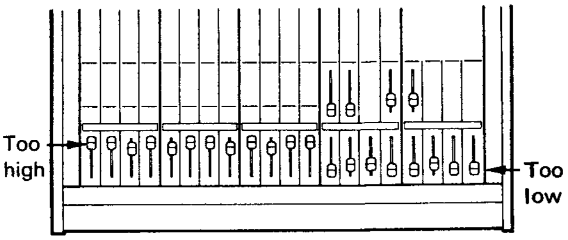
Many engineers like to EQ the low end before limiting to help avoid excessive "pumping" of the signal. If this is what you want to do, and, you have another channel free, do this: Take the DIRECT OUT from the first *Input Channel,* go to the limiter, use the first channel for your send, and *Don't Assign The First Channel To Any Output!*

It is not going to have all of your signal control modifications and will not be limited. To reach a BUSS, patch from the limiter out to the second *Input Channel's* ACCESS RCV jack. Now you can set the limiter input level with the first channel's TRIM and fader, do part of your EQ, and run your final signal with the second channel's fader. You will have EQ available both before and after the limiter with the minimum of electronic stages. This "patch" is also recommended when pre & post EQ are desired for use with any signal processing unit and will also give you "double EQ" using the smallest possible electronic package for those stubborn processing jobs that only brute force will fix.

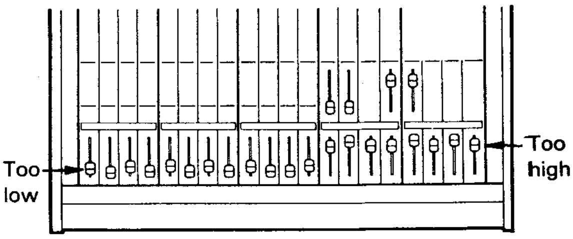
A Final Word of Mixdown Advice:

All finished tapes must be balanced – one sound and its tone judged by blending with others. Don't depend on EQ in "solo" to set up a "perfect" tone, because the minute you add your perfect sound back to the "mix" the tone may not be so "perfect". Always try to get the levels as close to "right" as possible before using EQ. If the mix is close, you will know which tracks need fine EQ tuning to be heard. Less EQ means less distortion and full boost at 5K on every pot will also boost the noise in your mix as well as the signal.

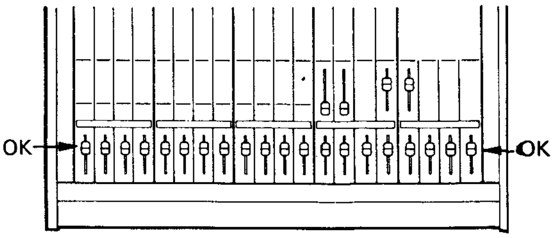
1. If your console faders always wind up like this, you are likely to be over-loading your summing amps. Pull down the inputs and raise the master.



2. Conversely, if this is what you usually have, you are getting too much gain from your master. Your mix is clean, but noisy.



3. This picture is a reasonable compromise, and is probably better all around.



THE DB; WHO, WHAT, WHY

No matter what happens to the signal while it is being processed, it will eventually be heard once again by a human ear. So the process of converting a sound to an electrical quantity and back to sound again must follow the logic of human hearing.

The first group of scientists and engineers to deal with the problems of understanding how the ear works were telephone company researchers, and the results of their investigations form the foundation of all the measurement systems we use in audio today. The folks at Bell Laboratories get the credit for finding out how we judge sound power, how quiet a sound an average person can hear, and almost all of the many other details about sound you must know before you can work with it successfully.

From this basic research, Bell Labs developed a system of units that could be applied to all phases of the system. Sound traveling on wires as electrical energy, sound on tape as magnetic energy, sound in air; anyplace that sound is, or has been stored as energy until some future time when it will again be sound, can be described by using the human ear-related system of numbers called "bels" in honor of Alexander Graham Bell, the inventor of the telephone.

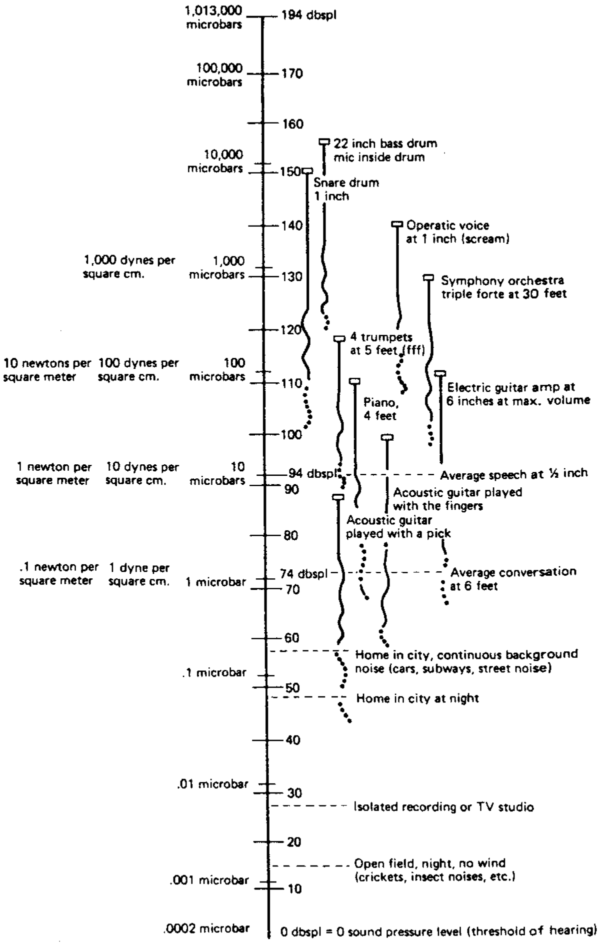
What is a bel and what does it stand for?

It means, very simply, twice as loud to the human ear. Twice as loud as what? An obvious question. The bel is always a comparison between two things. No matter what system of units of measure you are working with at the time, you must always state a value as a reference before you can compare another value to it by using bels, volts, dynes, webers – it doesn't matter, a bel, or ear-related statement of "twice as loud" is always a ratio, not an absolute number. Unless a zero, or "no difference" point is placed somewhere, no comparison is possible.

There are many positive and definite statements of reference in use today. But before we go over them, we should divide the "bel" into smaller units. "Twice as loud" will be a little crude to be used all the time. How about one tenth of a bel? Okay, the decibel it is, and 0 means "no difference, same as the reference". It seldom means "nothing". Now, if you double the power, is that twice as loud? No, it is only 3 dB more sound. If you double an electrical voltage, is it twice as loud? No, it is only 6 dB more sound. The unit quantities must follow nonlinear progressions to satisfy the ears' demand.

Remember, decibels follow the ears. All other quantities of measure must be increased in whatever units necessary to satisfy the human requirements, and may not be easy to visualize. Sound in air, our beginning reference, is the least sound the human ear (young men) can detect at 1000 to 4000 Hz. Bell Labs measured this value to be .0002 microbar, so we say 0 dB = .0002 microbars and work our way up from the bottom, or "no perceivable sound to humans" point. Here is a chart of sounds and their ratings in dB, using .0002 microbar pressure change in air as our reference for 0 dB spl (Sound Pressure Level).

Sound and Music Reference



Since the reference is assumed to be the lowest possible audible value, dB spl is almost always positive, and correctly written should have a + sign in front of the number. But it is frequently omitted. Negative dB spl would indicate so low an energy value as to be of interest to a scientist trying to record one cricket at 1,000 yds. distance, and is of no significance to the multichannel recordist. Far more to the point is the question "What is a microbar?" It is a unit of measurement related to atmospheric pressure and although it is extremely small, it must be divided down quite a lot before it will indicate the minimum pressure change in air that we consider minimum audible sound. This will give you a better idea of the sensitivity of the human ear.

One whole atmosphere, 14.70 pounds per square inch, equals 1.01325 bars. So one whole atmosphere in microbars comes out to be 1,013,250. One microbar of pressure change is slightly less than one millionth of an atmosphere, and you can find it on our chart as 74 dB spl. It is not terribly loud, but it is certainly not hard to hear. As a matter of fact, it represents the average power of conversational speech at 6 feet. This level is also used by the phone company to define normal earpiece volume on a standard telephone. Now think about that minimum audible threshhold again:

0.0002 microbar.

That's two ten thousandths of a millionth part of one atmosphere!

This breakdown of one reference is not given just to amaze you, or even to provide a feel for the quantity of power that moderate levels of sound represent. Rather it is intended to explain the reason we are saddled with a ratio/logarithm measurement system for audio. Adding and subtracting multi-digit numbers might be easy in this age of pocket calculators, but in the 1920's when the phone company began its research into sound and the human ear, a more easily handled system of numbers became an absolute necessity. Convenience for the scientist and practical engineer, however, has left us with a system that requires a great deal of complex explanation before you can read and correctly interpret a "spec sheet" for almost any piece of gear.

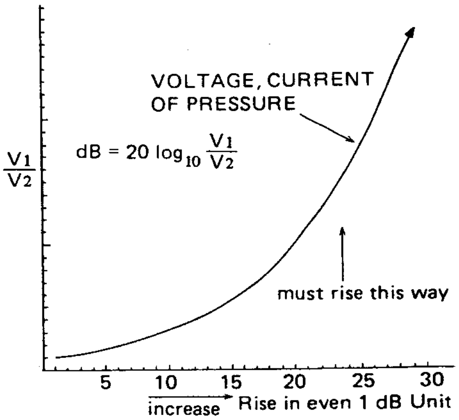
Here are the formulae for unit increment, but they are necessary only for designers. And unless you build your own gear, you won't have to deal with them. For power (watts) increase or loss, calculate by the following equation:

$$10\ \mathrm{LOG}_{10}\frac{P2}{P1} = N\ (\mathrm{dB})$$

For voltage, current or pressure calculations:

$$20\ \mathrm{LOG}_{10}\frac{V2}{V1} = N\ (\mathrm{dB})$$

Once we have this chart, we can see the difference between the way humans perceive sound and the amount of force it takes to change air pressure. Unfortunately, the result is not a simple "twice as much pressure" of sound to be heard as "twice as loud". If you plot decibels as the even divisions on a graph, the unit increase you need is a very funny curve.



This is how the ear works, and we must adapt our system to it. We have no choice if we expect our loudspeaker to produce a sound that resembles the original sound we begin with. The high sensitivity to sound of the human ear produces a strong "energy" illusion that has confused listeners since early times. How powerful are the loudest sounds of music in real power? Can sound be used as a source of energy to do useful work, such as operating a car? For any normally "loud" sound, the answer is, regrettably, no! Perhaps not so regrettably, consider what would happen if one pound of pressure was applied not to your head, but directly to your inner ear. One pound of air pressure variation is 170 dB spl. This amount of "power" might do some useful work – but not much, it's still only one pound and to make use of it you will have to stand one mile away or you will go deaf immediately.

If we reduce our sound power to realistic musical values, we will not be injured, but we will have almost nothing (in real power terms) to run the mic with! This low available energy is the reason that high gain amplifiers are required for microphones.

When we take a microphone and "pick up" the sound, we do have some leeway in deciding how much energy we must have in order to operate the electrical part of our system. If we can decide that we don't have to truly hear the signal while we are processing it from point to point and we can wait until the electronic devices have done all their routing and switching before we need audible sound, we can lower the power of the signal. What is a good value for a reference here? Well, we need to have enough energy so that the signal is not obscured by hiss, hum, buzz or other unpleasant things we don't want, but not so high that it costs a fortune in "juice" or electrical power. This was a big consideration for the telephone company.

They now have the world's biggest audio mixing system, and even when they started out, electricity was not free. They set their electrical power signal reference as low as was practical at the time, and it has lowered over the years as electronic equipment has gotten better. In 1939 the telephone company, radio broadcasting, and recording industry got together and standardized 1 milliwatt of power as 0 dBm, and this is still the standard of related industries. Thus, a 0 dBm signal at a 600 ohm line impedance will present a voltage of 0.775 volts.

Once again, we owe you an explanation. Why does it say *ZERO* on the meter? What is an ohm? Why 600 of them and not some other value? What's a volt? Let's look at one thing at a time.

1. The logic of *ZERO* on the meter is another hangover from the telephone company practice. When you start a phone call in California, the significant information to a telephone company technician in Boston is – did the signal level drop? If so, how much? When the meter says *ZERO* it indicates (to the phone company) that there has been no loss in the transmission, and all is well. The reference level is one milli-watt of power, but the gain or loss is in the information the meter was supposed to display, so the logic of *ZERO* made good sense, and that's what they put on the dial. We still use it even though it's not logical for anything else, and the idea of a reference level described as a "no loss" *ZERO*, no matter what actual power is being measured is so firmly set in the minds of everyone in the audio world that it is probably never going to change.

2. One ohm is a unit of resistance to the passage of electrical energy. The exact reasons for the choice of 600 ohms as a standard are connected to the demands of the circuits used for long distance transmission and are not simple or easy to explain. Suffice it to say that the worst possible thing you can do to a piece of electronic equipment is to lower the resistance it is expected to work into (the load). The lower the number of ohms, the harder it is to design a stable circuit. When you think about "load", the truth is just the opposite of what you might expect! 0 ohms is a "short circuit", no resistance to the passage of signal. If this condition occurs before your signal gets from California to Boston, you won't be able to talk – the circuit didn't "get there", it "shorted out". Once again, telephone company logic has entered the language on a permanent basis. Unless the value for ohms is infinity (no contact, no possible energy flow) you will be better off with a higher value, and many working electronic devices have input numbers in the millions or billions of ohms.

3. A volt is a unit of electrical pressure, and by itself is not enough to describe the electrical power available. To give you an analogy – that may help, you can think of water in a hose. The pressure is not the amount of water, and fast flow will depend upon the size of the hose (impedance or resistance) as well. Increase the size of the pipe (lower the resistance, or Z) and pressure (volts) will drop unless you make more water (current) available to keep up the demand. This analogy works fairly well for DC current and voltage, but alternating current asks you to

imagine the water running in and out of the nozzle at whatever frequency your "circuit" is working at, and is harder to use a mental aid. Water has never been known to flow out of a pipe at 10,000 cycles per second.

This reference level for a starting point has been used by radio, television, and many other groups in audio because the telephone company was the largest buyer for audio equipment. Most of the companies that built the gear started out working for the phone company and new audio industries, as they came along, found it economical to use as much of the ready-to-hand stuff as they could, even though they were not routing signals from one end of the world to the other.

Must we use this telephone standard for recording? Its use in audio has been so widespread that many people have assumed that it was the only choice for quality audio. Not so.

A 600 ohm, 3-wire transformer-isolated circuit is a necessity for the telephone company, but the primary reason it is used has nothing to do with audio quality. It is noise, hum and buzz rejection in really long line operation (hundreds and hundreds of miles).

Quality audio does not demand 600 ohm, 3-wire circuitry. In fact, when shielding and isolation are not the major consideration, there are big advantages in using the 2-wire system that go well beyond cost reduction. It is, as a system, inherently capable of much better performance than 3-wire transformer-isolated circuits.

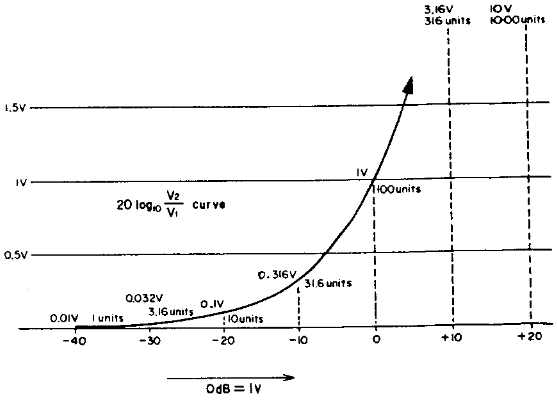
Since TASCAM mixing console is designed to route a signal from a mic to a recorder, we think that the 2-wire system is a wise choice. The internationally accepted standard (IEC) for electronics of this kind uses a voltage reference without specifying the exact load it is expected to drive. The reference is this:

0 = 1 volt

This is now the preferred reference for all electronic work except for the telephone company and some parts of the radio and television business. Long distance electronic transmission still is in need of the 600-ohm standard.

If your test gear has provision for inserting a 600 ohm load, be sure the load is not used when working on TASCAM equipment.

Now that we have given a reference for our "0" point, we can print the funny curve again, with numbers on it, and you can read voltages to go along with the changes in dB.



SIMPLIFY THE DB AND ITS MANY VARIATIONS

When it comes to describing the level of audio signal in a circuit, the whole issue of "dB's" may seem very complicated to anyone but a mathematically skilled engineer. However, by comparing audio signals to water flowing through a pipe (a "circuit"), we can simplify the concept of dB and audio level so that it is less "magic" and more understandable (we hope).

First, let's define our terms for this comparison:

VOLTAGE:

It is similar to *WATER PRESSURE.* If voltage were truly water pressure, we would express it in pounds per square inch. Actually, another term for voltage is "EMF," which stands for "electromotive force," which really is the pressure on the electrons which causes them to flow through a circuit.

IMPEDANCE:

It is similar to the *RESISTANCE OF THE WATER PIPE TO THE FLOW OF WATER.* Electrically, impedance "impedes" or works against the flow of electrons in an AC circuit, so the restriction to water flow caused by the pipe's diameter and internal surface friction is like impedance. Electrical "resistance," while similar to impedance, applies to DC current. A speaker, for example, may have a 3 ohm DC resistance, but an 8 ohm impedance at 1 kHz.

POWER:

It is similar to the *AMOUNT OF WATER THAT FLOWS THROUGH THE PIPE.* If we were actually measuring water level, we might use a unit of volume such as liters, milliliters, gallons, quarts, ounces, etc. With electrical circuits, we use a unit of power – the watt, 1/1000 watt (the milliwatt).

We can consider the pipe to be the electrical input or output circuit. The pipe's *diameter* determines its *resistance to water flow*; a smaller diameter pipe (wire) has a higher resistance (analogous to impedance) because it makes it more difficult for the water (electrons) to flow.

If we aim the pipe up in the air and measure the height of water column that emerges from the end of the pipe, we have a level (power). With a pipe of a given diameter (impedance), the amount of water flowing is proportional to the water pressure (voltage). If you increase the pressure, you increase the height of the water stream emerging from the pipe.

Look at Figure 1. Note that a 0.775 volt "pump pressure" pushing water through a 600 ohm "pipe" causes the water "level" to reach 1 milliwatt in height. We'll call that level of water (1 milliwatt of power) a level of 0 dBm.

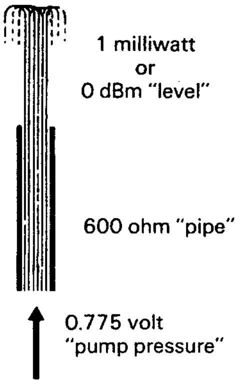


Figure. 1.

AN ESSENTIAL POINT TO REMEMBER: 0 dBm IS ALWAYS EQUAL TO ONE MILLIWATT. It doesn't matter how much water pressure (voltage) it took to achieve that level, or what pipe diameter (impedance) the water had to flow through ... if the water level reaches 1 milliwatt, the level is 0 dBm. Any other dBm value is merely a relative power level expressed in reference to the 1mW level.

Look at Figure 2. Here the same 0.775 volt "pump pressure" is pushing water through a pipe of 1200 ohm impedance. Since less water can flow through the smaller pipe, the water level emerging from the pipe is cut in half: 1/2 milliwatt – half the power. Since, with regard to power, half the level is a decrease of 3 dB, the level is now –3 dBm, not 0 dBm. As you can see, *WHEN YOU INCREASE THE IMPEDANCE WITHOUT CHANGING THE VOLTAGE, YOU GET LESS POWER* (fewer dBm). Conversely, if you decrease the impedance (large pipe), you'll increase the power (more dBm).

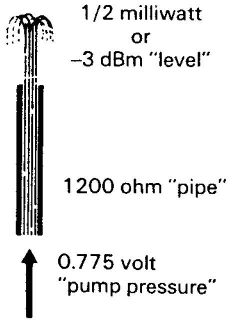


Figure 2.

FORGET THE NOTION THAT dBm REQUIRES A 600 OHM "PIPE". While dBm results from a combination of impedance and voltage, it refers only the end result ... The power (water column height).

Look at Figure 3. Notice that we can obtain a "level" of 0 dBm with a 1200 ohm pipe ... it simply takes more pump pressure than with a 600 ohm pipe. Since we doubled the impedance relative to Figure 1 (from 600 to 1200 ohms), we also have to increase the voltage to 1.1 volts (multiplying 0.775 V by 1.414, which is the square root of 2). The end result is the same, 1 milliwatt of power (water), which is 0 dBm.

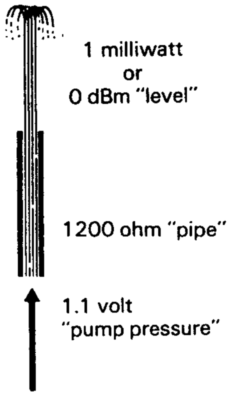


Figure 3.

It should now be clear that defining a level in *dBm* only defines the *power.* If you want to use dBm to describe a *voltage*, you'll have to specify a particular impedance or resistance (pipe), which is *typically given as 600 ohms, but could be any impedance or resistance.* *IF YOU HAVE A CIRCUIT WHICH DOES NOT USE MUCH POWER, BUT IS INSTEAD SENSITIVE TO VOLTAGE, EXPRESSING LEVEL IN dBm IS NOT PARTICULARLY USEFUL.* For this reason, other "dB" terms have been devised.

A high impedance input will not draw much power from a circuit unless the voltage is increased to a very high level. Why? Remember that the greater the impedance or resistance (the smaller the pipe), the less current can flow. Today, most mixers, power amplifiers, and other signal processors are no longer designed for 600 ohm input impedance. Instead, they have high impedance inputs which are sensitive to the voltage (pressure) of the input signal, not the power (water level).

When you double the level voltage-wise, you increase it 6 dB, whereas if you double the level power-wise, you increase it by 3 dB. The reason for this apparent discrepancy is not all that complex, but it involves some mathematics that we'll omit here to avoid getting too technical. Suffice it to say that the difference has to do with the fact that power is proportional to voltage squared, and "dB" is a logarithmic quantity. To keep the terms and numbers more appropriate to a voltage sensitive circuit, not a power sensitive one, a "dB" term which refers to voltage was developed – "dBV." The "V" in "dBV" denotes "voltage." (The "m" in "dBm" denotes "milliwatt.")

The 0 dBV reference is 1 volt. It was chosen because it's easier to work with than 0.775 volts when manipulating equations. 0 dB*V* is always associated with 1 volt, regardless of the impedance. It so happens that 0 dB*V* (voltage) will produce 0 dB*m* (power) only in a circuit with 1,000 ohms impedance (assuming voltage and current are in phase). Refer to Figure 4.

NOTE: The "purist" engineers among you will recognize the fact that all dB numbers always refer to a power level, but in practical terms, dBV is used to describe voltages, regardless of the actual circuit impedance.

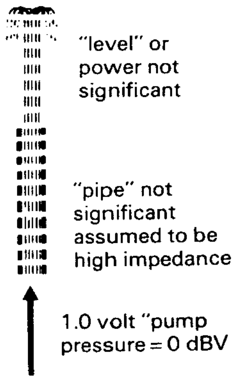


Figure 4.

TASCAM input and output levels have traditionally been rated in dBV because the equipment has high impedance circuitry which senses voltage, not power. There's only one slight complication in our practice of using dBV values, and it comes up when you interface a piece of TASCAM equipment to equipment which another manufacturer rated using an assumed 600 ohms impedance. The equipment will usually work properly, but the level calibration may be slightly inaccurate due to the differences between the dBm and dBV "0 dB" references.

Let's look at a practical example.

Refer to Figure 5. Suppose the TASCAM output is rated at 0 dBV, and the other equipment's input to which the TASCAM output is connected is rated at 0 dBm. Guess what happens. The 0 dBV output (1 volt), upon encountering a lower impedance (600 ohms rather than 1,000 ohms), causes more power to flow ... +2.2 dBm instead of 0 dBm. It's not a big difference, and it can usually be adjusted with a level control – assuming the output circuit is capable of driving 600 ohms (which may or may not be the case). However, the level which causes a "0" indication on the TASCAM output meter will drive the input meter to "+2.2" since it is calibrated based on a 0.775 volt "zero" into 600 ohms assumed impedance.

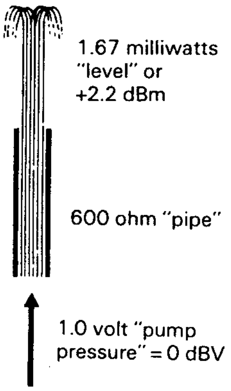

1.67 milliwatts "level" or +2.2 dBm
600 ohm "pipe"
1.0 volt "pump pressure" = 0 dBV

Figure 5.

Look at Figure 6. To avoid the possible error of 2.2 dB, the term "dBv" was introduced. Like "dBV", "dBv" is used to describe voltage, not power, but 0.775 volts is the "0 dBv" reference. The only difficulty with "dBv" was that many people ignore capitalization and confuse dB "big V" with dB "small v," so the 2.2 dB error persists. For this reason, we are now changing to "dBu" instead of "dBv." They're the same term (0 dBu = 0.775 volts), but hopefully people won't confuse a "u" with a "V".

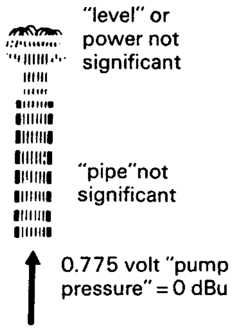

"level" or power not significant
"pipe"not significant
0.775 volt "pump pressure" = 0 dBu

Figure 6.

If a TASCAM output is rated at 0 dBu, it means it puts out 0.775 volts into a high impedance (it may also do so into a low impedance, if so specified). Connect a 0 dBu output to a 0 dBm nominal input, and the meters should match one another.

Different correction factors:

0 dBV = 1V	Voltage	0 dBm = 0.775V/ 600 Ω 0 dBu = 0.775 V/ higher than 600 Ω
+6 dB	2V	+8.2dB
+1.78 dB	1.228 V	+4 dB
0 dB	1V	+2.2 dB
−2.2 dB	0.775 V	0 dB
−6 dB	0.5 V	−3.8 dB
−8.2 dB	0.388 V	−6 dB
−10 dB	0.316V	−7.8 dB
−12 dB	0.250 V	−9.8 dB
−12.2 dB	0.245V	−10 dB
−20 dB	0.1 V	−17.8 dB

Note:
The "u" in "0 dBu" stands for "unbalanced".

IMPEDANCE MATCHING AND LINE LEVELS

All electronic parts, including cables and non-powered devices (mics, passive mixers and such), have impedance, measurable in ohms (symbol Ω or Z). Impedance is the total opposition a part presents to the flow of signal, and it's important to understand some things about this value when you are making connections in your mixing system. The outputs of circuits have an impedance rating and so do inputs. What's good? What values are best? It depends on the direction of signal flow, and in theory, it looks like this:

OUTPUTS ——→ **plug into** ——→ **INPUTS**

It is generally said that the output impedance (Z) should be as low as possible. 100 ohms, 10 ohms. The lower, the better, in theory. A circuit with a low output impedance will offer a low resistance to the passage of signal, and thus will be able to supply many multiple connections without a loss in performance or a voltage drop in any part of the total signal pathway. Low impedance values can be achieved economically by using transistors and integrated circuits, but other considerations are still a problem in practice, such as:

1. The practical power supply is not infinitely large. At some point, even if the circuit is capable of supplying more energy you will run out of "juice".
2. Long before this happens, you may burn out other parts of the circuit. The output impedance may be close to the theoretically ideal "ohms" but many parts in the practical circuit are not. Passing energy through a resistance generates heat and too much current will literally burn parts right off the circuit card if steps are not taken to prevent catastrophic failure.
3. Even if the circuit does not destroy itself, too high a demand for current may seriously affect the quality of the audio. Distortion will rise, frequency response will suffer, and you will get poor results.

Inputs should have very high impedance numbers, as high as possible (100,000 ohms, 1 million ohms, or more if it can be arranged).

A high resistance to the flow of signal at first sounds bad, but you are not going to build the gear. If the designer tells you his input will work properly and has no need for a large amount of signal, you can assume that he means what he says. For you, a high input impedance is an unalloyed virtue. It means that the circuit will do its job with a minimum of electrical energy as a beginning. The most "economical" electronic devices in use today have input impedances of many millions of ohms, test gear for example, voltmeters of good quality must not draw signal away from what they are measuring, or they will disturb the proper operation of the circuit. A design engineer needs to see what is going on in his design without destroying it, so he must have an "efficient" device to measure with.

SOURCE (output) ——plugs into——→ **LOAD (input)**

The classic procedure for measuring output impedance is to reduce the load's impedance until the output voltage drops 6 dB (half the original power) and note what the load value is. In theory, you now have a load impedance that is equal to the output impedance. If you gradually reduce the load (increase the input impedance), the dB reading will return slowly to its original value. How much drop is acceptable? What load will be left when an acceptable drop is read on the meter?

Traditionally, when the load value (input Z) is approximately seven times the output impedance, the needle is still a little more than 1 dB lower than the original reading.

Most technicians say, "1 dB, not bad, that's acceptable." We at TASCAM must say that we do not agree. We think that a seven-to-one ratio of input (7) to output (1) is not a high enough ratio, and here's why:

1. The measurement is usually made at a mid-range frequency and does not show true loss at the frequency extremes. What about the drop at 20 Hz or 30 kHz?

2. All outputs are not measured at the same time. Most people don't have twenty meters, we do. Remember, everybody plays together when you record and the circuit demands, in practice, are simultaneous. All draw power at the same time.

Because of this widely misunderstood rule of thumb – the seven-to-one ratio, we will give you the values for output impedance.

True Output Impedance

Even though the true output impedance may be low, say 100 ohms, it takes a lab to check the rule of thumb, so for the practical reasons we have explained, the use of the ratio method of impedance calculation must be changed to a higher ratio. We prefer 100:1 if possible and we consider 50:1 to be the minimum ratio that we think safe. Because of this, we will give you a number for ohms that you can match, Minimum Load Impedance. No calculations, we have made them already.

Minimum Load Impedance

MAKE CERTAIN THAT YOU CONNECT NO TOTAL LOAD IMPEDANCE LOWER (numerically) THAN THESE FIGURES.

PGM Output/AUX 1, 2, 3, 4 Output	2k ohms
Monitor Output (ST MSTR A/B)	2k ohms
Monitor Output (Balance type)	600 ohms
Direct Output	2k ohms
Access Send Output	2k ohms

Nominal Load Impedance

Our specifications usually show 10,000 ohms as a Norminal Load Impedance. This load will assure optimum performance. Remember, any Impedance lower than 10,000 ohms is more load.

Input Impedance

Input impedance is more straightfoward and require only one number. Here are the values for the M-520 and M-512:

Mic Input	2k ohms
Instrument Input	100k ohms
Tape [2TR A/B (L/R)] Input	47k ohms
Phono Input	47k ohms
Line Input	100k ohms
Program Sub Input	22k ohms
Aux Sub Input	22k ohms
Monitor Sub Input	22k ohms
Access Receive Input (Input)	220k ohms
Access Receive Input (Buss)	22k ohms
Spare Sub Input	100k ohms

If one output is to be "Y" connected to two inputs the total impedance of the two inputs must not be lower than the minimum load impedance, mentioned above, and if it becomes necessary to increase the number of inputs with slight reduction of the load specifications, you must check for a drop in level, a loss of headroom, low frequency response, or else suffer from a bad recording. If one input is 10,000 ohms, another of the same 10,000 ohms will give you a total input impedance (load) of 5,000 ohms. To avoid calculations you can do the following when you have two inputs to connect to one output.

Take the lower value of the two input impedances and divide it in half. If the number you have is greater than the minimum load impedance, you can connect both at the same time. Remember, we are not using the true output impedance we are using the adjusted number, the minimum, output load impedance.

If you must have exact values here is the formula for dissimilar 2 loads or inputs:

$$RX = \frac{R1 \times R2}{R1 + R2}$$

When you have more than two loads (inputs), just dividing the lowest impedance by the number of inputs will not be accurate unless they are all the same size. But if you still get a safe load then the minimum load impedance by this method, you can connect without worry.

If you must have exact values, here is the formula for more than 2 loads or inputs:

$$RX = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3} + \cdots + \frac{1}{Rn}}$$

RX = Value of Total Load

Finding Impedance Values on Other Brands of Equipment

When you are reading an output impedance specification, you will occasionally see this kind of statement:

Minimum load impedance = X ohms

or

Maximum load impedance = X ohms

These two statements are trying to say the same thing, and can be very confusing. The minimum load impedance says: Please don't make the *NUMBER* of ohms you connect to this output any lower than X ohms. That's the lowest *NUMBER*. The second statement changes the logic, but says the exact same thing.

Maximum load impedance refers to the idea of the *LOAD* instead of the number, and says: please don't make the *LOAD* any heavier. How do you increase the load? Make the number lower for ohms. Maximum load means minimum ohms, so read carefully.

When the minimum/maximum statement is made, you can safely assume that the manufacturer has already done his calculations, and the number given in ohms does not have to be multiplied. You can *MATCH* the value of your input to this number of ohms successfully; but as always, higher ohms will be okay (less load).

Occasionally, a manufacturer will want to show you that 7 times the output Z is not quite the right idea and will give the output impedance and the correct load this way, they will call the output impedance the True Output Impedance and then will give the recommended minimum *LOAD* impedance. It may be a higher or lower ratio than 7 times and will be whatever the specific circuit in question requires.

REFERENCE LEVELS

We should talk about one more reference, a practical one.

Anyone who has ever watched a VU meter bounce around while recording knows that "real sound" is not a fixed value of energy. It varies with time and can range from "no reading" to "good grief" in less time than it takes to blink. In order to give you the numbers for gain, headroom and noise in the console, we must use a steady signal that will not jump around. We use a tone of 1,000 cycles and start it out at a level of –60 dB at the mic input, out beginning reference level. All levels after the mic input will be higher than this, showing that they have been amplified, and eventually we will come to the last output of the console – the line-out and the reference signal there will be –10 dB, our "line level" reference.

From this you can see that if your sound is louder than 94 dB spl, or your mic will produce more electricity from a sound of 94 dB spl than –60 dB, all these numbers will be changed. We have set this reference for mic level fairly low. If you examine the sound power or sound pressure level (spl) chart on page 8 you will see that most musical instruments are louder on the average than 94 dB spl, and most commercial mics will produce more electricity than the –60 dB for a sound pressure of 94 dB, so you should have no problems getting up of "0 VU" on your recorder.

We should also make a point of mentioning that the maximum number on this chart represents "peak power" and not average power. The reason? Consider if even some momentary part of your recording is distorted, it will force a re-recording and it is wisest to be prepared for the highest values and pressure even if they only happen "once in a while". On this point, statistics are not going to be useful, the average sound pressure is not the whole story. The words themselves can be used as an example. Say the word "statistics" close to the mic while watching the meters and the peak LED level detector. Then say the word "average". What you are likely to see are two good examples of the problems encountered in the "real world" of recording. The strong peaks in the "s" and "t" sounds will probably cause the LED's to flash long before the VU meter reads anywhere near "zero" while the vowel sounds that make up the word "average" will cause no such drastic action.

To allow peaks to pass undistorted through a chain of audio parts, the individual gain stages must all have a large reserve capability. If the average is X then X, + 20 dB is usually safe for speech, but extremely percussive sounds may require as much as 40 dB of "reserve" to insure good results. Woodblocks, castanets, latin percussion (guido, afuche) are good examples of this short term violence that will show a large difference between "LED flash" and actual meter movement. When you are dealing with this kind of sound, believe the LED, it is telling you the truth.

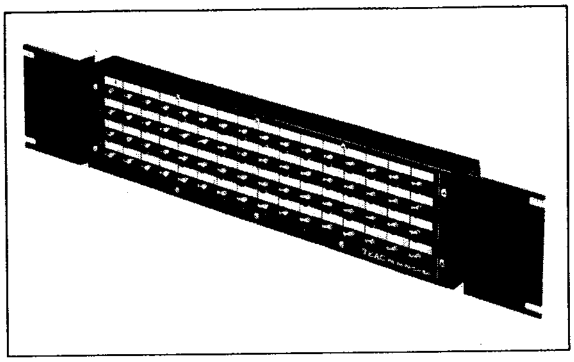
If you are going to record very loud sounds you may produce more electrical power from the mic than the console can handle as an input. How can you estimate this in advance? Well, the spl chart and the mic sensitivity are tied together on a one-to-one basis. If 94 dB spl gives –60 dB (1 mV) out, 104 dB spl will give you –50 dB out, and so forth. Use the number, on our chart for sound power together with your mic sensitivity ratings to find out how much level, then check that against the maximum input levels for the various jacks on the console. If your mic is in fact producing –10 dB or line level, there is nothing wrong with plugging it into the line level connections on the mixer. You will need an adaptor, but after that it will work!

Most mic manufacturers give the output of their mics as a minus-so-many-dB number, but they don't give the loudness of the test sound in dB, it's stated as a pressure reference (usually 10 microbars of pressure). This reference can be found on our sound chart. It is 94 dB spl, 10 microbars, 10 dynes per cm^2 or 1 Newton per square meter. For mics, the reference "0" is 1 volt (dB). So, if the sound is 94 dB spl, the electrical output of the mic is given as –60 dB, meaning so many dB less than the reference 0 = 1 volt. In practice, you will see levels of –60 dB for low level dynamics, up to about –40 dB or slightly higher for the better grade of condenser mics available today. TASCAM recorders and mixers work at a level of –10 dB referenced to 1 volt (0.3 volt) so, for 94 dB spl, a mic with a reference output of –60 dB will need 50 dB of amplification from your console or recorder in order to see "0 VU" (–10 dB) on your meter. Now, if the sound you want to record is louder than 94 dB spl, the output from the mic will be more powerful and you will need less amplification from your console to make the needles on your recorder read "0 VU".

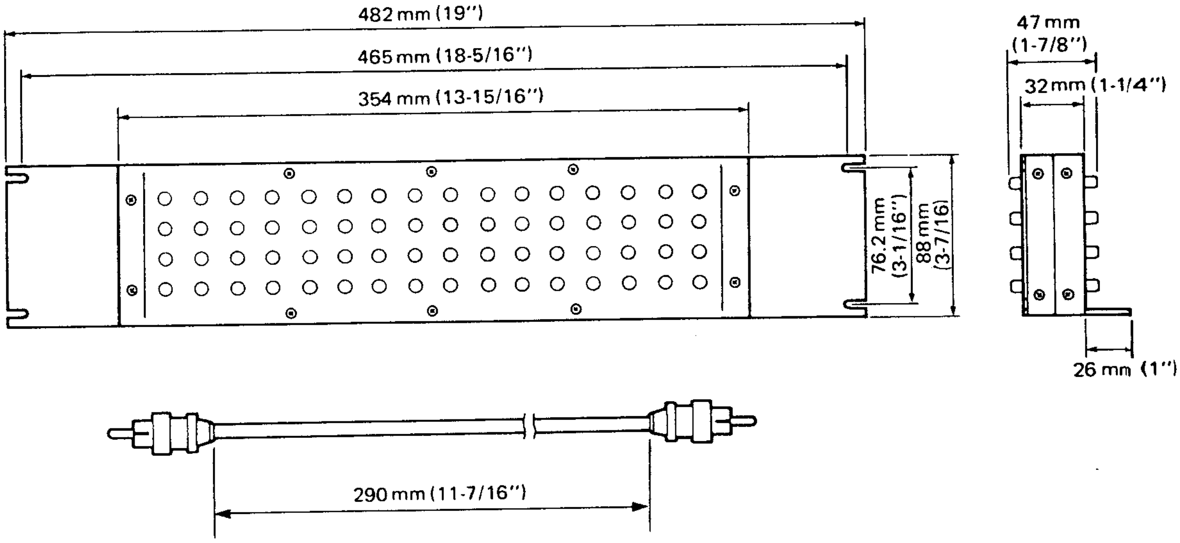
OTHER USEFUL ACCESSORIES

In addition to the Model 1, we also offer these valuable additions to your system.

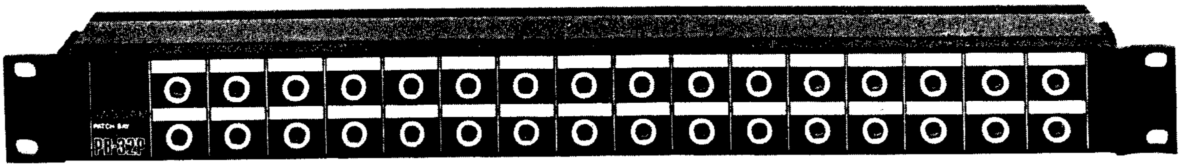
The PB-64 Patch Bay



When your system begins to expand beyond the basic, sorting out where things go can take much time away from the recording process. This accessory will allow you to speed things up and get back to what you really want to do. Sixty-four RCA pins on a panel. So you can bring all those jacks to where you are. It will get you off the floor and back to recording. Connect all your inputs and outputs to the back, and you can reroute your signals with short jumpers quickly.


482 mm (19")
465 mm (18-5/16")
354 mm (13-15/16")
76.2 mm (3-1/16")
88 mm (3-7/16)
47 mm (1-7/8")
32 mm (1-1/4")
26 mm (1")
290 mm (11-7/16")

TESCAM PB-32 Series Patch Bays

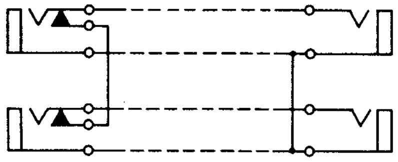
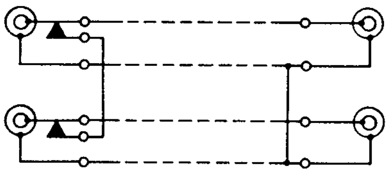
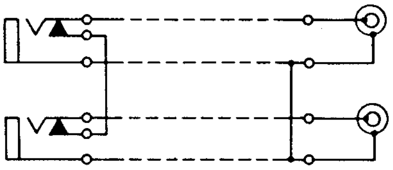
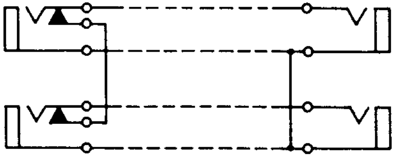
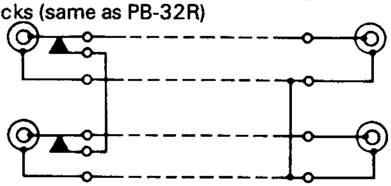

PATCH BAY
PB-32P

(Model PB-32P)

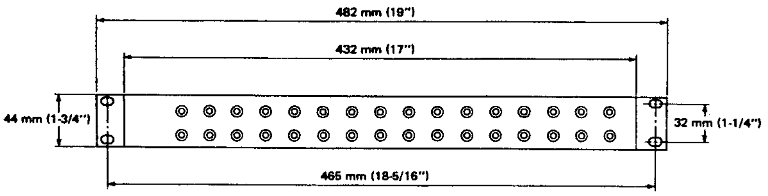
The PB-32 Series Patch Bays are ideal for any application in multitack recording process. They are available in four basic configurations listed below, and can be mounted in 19" EIA rack. They also features "normalled" connections to provide the maximum in patching convenience without the need to patch through unused circuits.

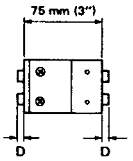
Specifications

Number of channels:	16
Type of jacks:	RCA pin jacks and/or 1/4" phone jacks Front jacks with switches: white Rear jacks without switches: red
Dimensions (W x H x D):	482 x 44 x 75 (19" x 1-3/4" x 3")
Weight:	1.3 kg (2-14/16 lbs.)

Model name	Type of jacks	Internal circuit connection (FRONT) (REAR)
PB-32P	1/4" phone jack (front and rear)	Upper Lower 
PB-32R	RCA pin jack (front and rear)	Upper Lower 
PB-32H	1/4" phone jack (front) RCA pin jack (rear)	Upper Lower 
PB-32W	1/4" phone jack (leftmost 12 jacks, front and rear) RCA pin jack (rightmost 20 jacks, front and rear)	Leftmost 12 jacks (same as PB-32P) Upper Lower  Rightmost 20 jacks (same as PB-32R) Upper Lower 

External Dimensions





D : 2 mm (1/16") (1/4" phone jacks)
7 mm (1/4") (RCA pin jacks)

CS-512 and CS-520 Pedestal

CS-512 (for M-512)
CS-520 (for M-520)

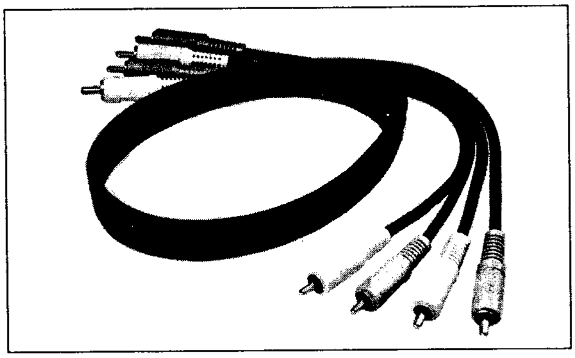
M-520 with CS-520

CS-513 and CS-521 Top Board

CS-513 (for M-512)
CS-521 (for M-520)

M-520 with CS-520 and CS-521

Professional Low Loss Cable



There are vast differences in cable design and performance, and those differences can make or break an otherwise excellent sound system. When you're investing in the kind of high quality audio equipment represented by the TASCAM Studio Series, it makes sense to use TASCAM professional audio cables. Anyone who's switched to them will tell you they're worth every cent.

LOW CAPACITANCE CABLE

Our cables feature very low capacitance under 15 picofarads per foot, so they don't act as high-frequency roll-off filters as do typical cables of 100 or 300 pF/foot. In addition, our cables use an ultra-high density bare-copper braided shield (99% coverage), so electrostatic noise (Buzz or hum) and RFI (CB or broadcast signals) are kept out of your program.

Low capacitance is important, and so is consistent capacitance; that is, you want the electrical coupling of center conductor-to-shield to remain the same throughout the cable, even if it is sharply bent, crushed, flexed, or tugged. Should the local cable capacitance change, noise and/or signal losses often result. We utilize the unique dielectric known as Datalene. This special insulation keeps the stranded signal conductor perfectly centered within the shield. Datalene is about as flexible as foam core dielectrics but far more resistant to extreme heat or cold, and it has a "memory", so it retains its shape after flexing. Datalene also acts as a mechanical shock absorber, guarding against external impacts which, in other cables, might sever the center conductors and cause intermittent contact.

When we join the connector to the cable, we insert the cable's stranded center conductor all the way into the pin and then fill the pin with solder. The braid is wrapped and soldered a full 120° around the shell, not tacked at one spot, so you get maximum shielding and strength.

Note: If TASCAM professional audio cables are not obtainable in your area, use an equivalent cable.

MORE INFORMATION IS AVAILABLE

We've tried to give you representative examples of some of the things you can do to get started, and you'll discover many more – some by way of happy coincidence, others after long hours of concentration. If you're just getting into recording and want to expand your knowledge, more information is available.

BIBLIOGRAPHY

Beranek, Leo L.
ACOUSTICS
McGraw-Hill Book Co., Inc.
New York, New York
1954
More concerned with exact formulae, but still very readable. It is not necessary to do calculations to gain knowledge from this textbook.

Beranek, Leo L.
MUSIC ACOUSTICS AND ARCHITECTURE
John Wiley & Sons, Inc.
New York, N. Y.
1962
A technical survey on concert halls with much documentation. Worth reading. This author has many useful stories to tell about the interface of science and art.

Clifford, Martin
MICROPHONES: HOW THEY WORK AND HOW TO USE THEM
Tab Books
Blue Ridge Summit, Pa.
1977
An excellent lowcost book for the beginner on microphone types, history and construction. The explanations given assume no prior knowledge and are very complete. Recommended.

Everest F. Alton
ACOUSTIC TECHNIQUES FOR HOME AND STUDIO (3rd. Printing)
Tab Books
Blue Ridge Summit, Pa.
1978
Low-cost basic book. This book on studio acoustics is the easiest to read and understand of all the textbooks on the subject, and comes closest to dealing with the actual problems encountered in the home studio.

Everest F. Alton
HANDBOOK OF MULTICHANNEL RECORDING
Tab Books
Blue Ridge Summit, Pa.
1976
A survey volume containing good information on all topics. Very clearly written and recommended for a beginner.

Nisbett, Alec
THE TECHNICS OF THE SOUND STUDIO FOR RADIO, TELEVISION AND FILM
Hastings House Publishers, Inc.
New York, N. Y.
1976
Although not specifically written for the tape recordist, this 500-page book is well worth its cost. Very useful practical advice if you are working with speech (drama, commercial announcing, etc.)

Nisbett, Alec
THE USE OF MICROPHONES
Hastings House
New York, N. Y.
1976
The author's point of view is basically radio, but his ability to communicate difficult concepts is very good. Well illustrated.

Olsen, Harry F.
ACOUSTICAL ENGINEERING
D. Van Nostrand Company
New York, N. Y.
1957

and

Olsen, Harry F.
MUSICAL ENGINEERING
D. Van Nostrand Company
New York, N. Y.
1959
Anything you can find by this writer is worthwhile, and the latter book in particular will give scientific answers to musical questions (what frequency is the note Db above middle C?) and can be used to translate one "language" into another. Extremely valuable.

Rettinger, Michael
ACOUSTIC DESIGN AND NOISE CONTROL, VOL. 1
Chemical Publishing Company
New York, N. Y.
1977
Although this book is highly technical, the writing is very lucid and many examples are given to go along with the math. This writer is not afraid to draw conclusions and give his reasons for doing so in simple language.

Runstein, Robert E.
MODERN RECORDING TECHNIQUES
Howard W. Sams and Co.
Indianapolis, Indiana
1974
The first low-cost book on studio practice. The equipment dealt with is somewhat outdated, but the theory is still the same. Excellent basic survey.

Tremaine, Howard M.
THE AUDIO CYCLOPEDIA
Howard W. Sams and Co.
Indianapolis, Indiana
1976
This 1,700-page reference work is sure to contain the answer to almost any technical question you can think of. The writing assumes much prior knowledge and this book should be used with others that are more basic in their writing style if you are new to the field of scientific audio.

SOME MAGAZINES OF INTEREST:

"db" – THE SOUND ENGINEERING MAGAZINE
1120 Old Country Road
Plainview, N. Y. 11803

"MODERN RECORDING"
14 Vanderventer Avenue
Port Washington, N. Y. 11050

"RE/P" – RECORDING ENGINEER/PRODUCER
1850 Whitley Street, Suite 220
Hollywood, Ca. 90028

STUDIO SOUND And Broadcast Engineering
Link House Publications PLC
Linc House, Dingwall Avenue
Croydon CR9 2TA, Great Britain

M-512 SPECIFICATIONS

1. 12-Input/8-PGM Output/2-Monitor Output (x2)/ 4-AUX Output/8-Tape Monitor/8-Balanced Amp:

2. Input Selector:

Channels 1,2	MIC/INSTrument/TAPE
Channels 3,4	MIC/PHONO/TAPE
Channels 5–8	MIC/LINE/TAPE
Channel 9	MIC/LINE/2TR A (L)
Channel 10	MIC/LINE/2TR A (R)
Channel 11	MIC/LINE/2TR B (L)
Channel 12	MIC/LINE/2TR B (R)

3. Mic Input (Low Impedance) – channels 1–12:

Mic Impedance	200 to 600 ohms nominal (matched for mics of 600 ohms or less)
Input Impedance	2k ohms, balanced, XLR type equivalent
Nominal Input Level	–60dBV (1mV)
Minimum Input Level	–70dBV (0.3mV), MIC TRIM to max.
Maximum Input Level	+18dBV (8V), MIC ATT to 30dB, MIC TRIM to min.

4. Instrument Input – channels 1,2:

Input Impedance	100k ohms
Nominal Input Level	–50dBV (3mV)
Maximum Input Level	+10 dBV (3.15V), TAPE TRIM to min.
Minimum Input Level	–58dBV (1.3mV) TAPE TRIM to max.

5. Tape Input (TAPE – channels 1–8, 2TR A/B – channels 9–12):

Input Impedance	47k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

6. Phono Input – channels 3,4:

Input Impedance	47k ohms
Nominal Input Level	–54dBV (2mV) at 1kHz
Minimum Input Level	–62dBV (0.8mV) at 1kHz, TAPE TRIM to max.
Maximum Input level	–25dBV (56mV) at 1kHz, TAPE TRIM to min.

7. Line Input – channels 5–12:

Input Impedance	100k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

8. PGM/AUX 1, 2, 3, 4 Output:

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

9. Stereo Master A/B Output:

Output Impedancee	100 ohms
Minimum Load Impedance	,2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

10. Balanced Amp Input [Separate type]:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+15dBV (5.6V)

11. Balanced Amp Output [Separate type]:

Nominal Load Impedance	600 ohm, balanced
Nominal Output Level	+4dBm (1.23V)/+8dBm (1.95V) switchable
Maximum Output Level	+28dBm (19.5V)

12. Direct Output:

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

13. Access Send Output (Input 1–12/Buss 1–8):

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

14. Access Receive Input (Input 1–12):

Input Impedance	220k ohms
Nominal Input Level	–10dBV (0.3V)
Minimum Input Level	+18dBV (8V)

15. Access Receive Input (Buss 1 – 8):

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

16. Program Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

17. Aux Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

18. Monitor Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

19. Spare Sub Input:

Input Impedance	100k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

20. Oscillator Output:

Frequency	40Hz/1kHz/10kHz switchable
Output Impedance	470 ohms
Nominal Output Level	–10dBV (0.3V)

21. Headphones Output:

Nominal Load Impedance	8 ohms
Maximum Output Power	Greater than 100mW, 8 ohms

22. Frequency Response: Line Input to –

PGM Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Aux Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Mon Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Headphones Output	50Hz – 20kHz ± 2dB (Reference 30kHz ± 3dB)

23. Equalizer:

Type	Sweep
Level	Boost/Cut ± 15dB
Frequency (Low)	50Hz to 500Hz
(Middle)	100Hz to 5kHz
(High)	2.5kHz to 15kHz

24. Signal to Noise Ratio (at nominal input levels, EQ out, UNWTD/"A" WTD):

1 line to 1 PGM output	86dB/87dB
8 lines to 1 PGM output	77dB/80dB
1 line to access send	90dB/92dB
1 line to direct output	88dB/90dB
1 tape to 1 PGM output	86dB/87dB
8 tape to 1 PGM output	77dB/80dB
1 tape to access send	90dB/92dB
1 tape to direct output	88dB/90dB
1 mic to 1 PGM output	68dB/70dB (150 ohm source)
12 mic to 1 PGM output	52dB/58dB (150 ohm source)
1 mic to access send	68dB/70dB (150 ohm source)
1 mic to direct output	68dB/70dB (150 ohm source)
1 inst to 1 PGM output	72dB/74dB
1 phono to 1 PGM output	65dB/68dB
Balanced output	90dB/95dB

25. Cross Talk:	Better than 70dB (1kHz, nominal input level) Better than 60dB (15kHz, nominal input level)

26. Total Harmonic Distortion (THD):

1 mic input to 1 PGM output	0.025% (at 1kHz, EQ OUT, nominal input level above 50dB and MIC ATT 30dB on, with 30kHz L.P.F. and 400Hz H.P.F. connected)
1 line input to 1 PGM output	0.02% (at 1kHz, EQ OUT, nominal input level , with 30kHz L.P.F. and 400Hz H.P.F. connected)

27. Intermodulation Distortion (IMD), (SMPTE Method):

1 mic input to 1 buss output	0.06% (EQ OUT, nominal input level above 50dB and MIC ATT 30dB on)
1 line input ot 1 buss output	0.045% (EQ OUT, nominal input level)

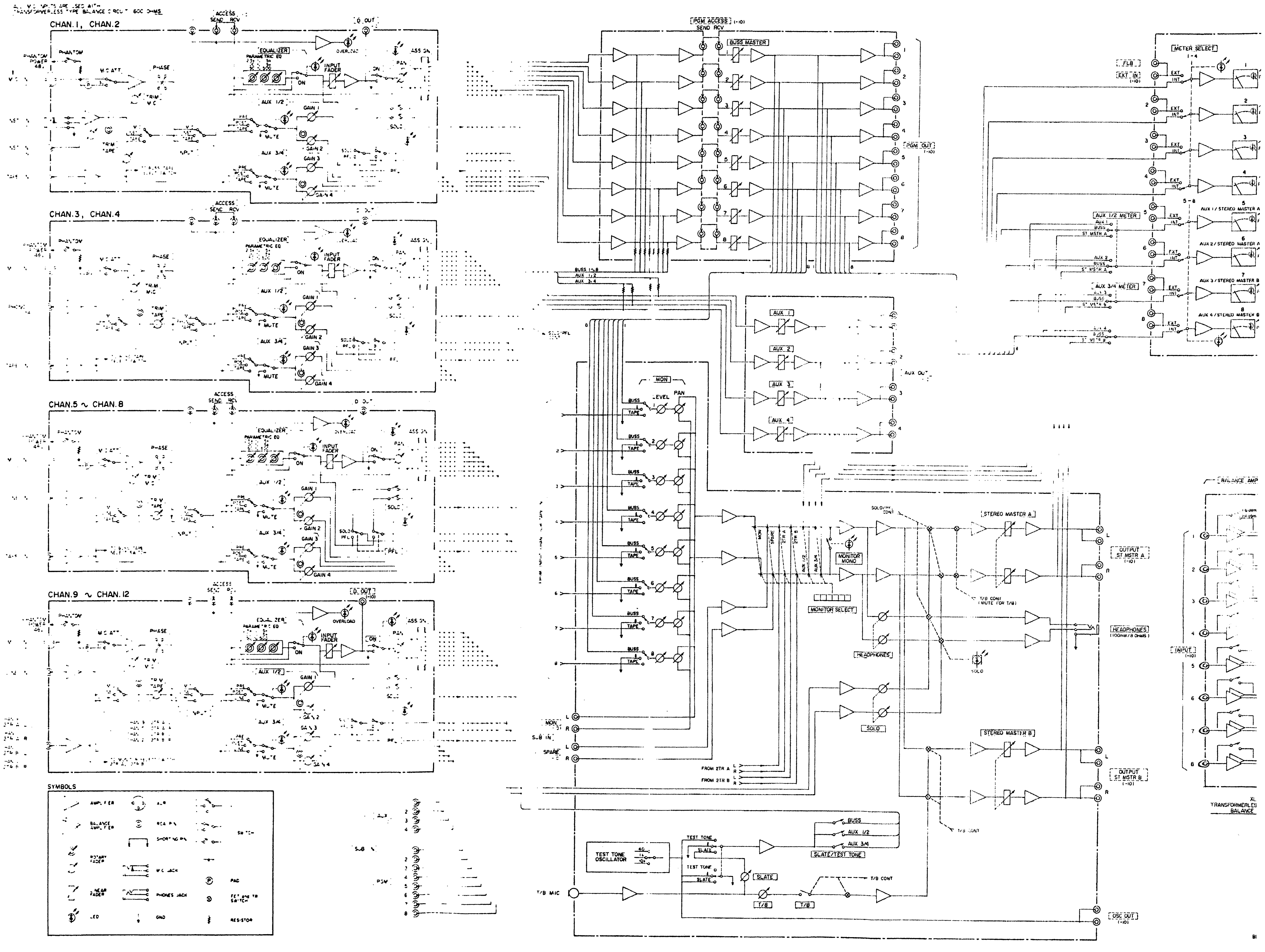
28. Fader Attenuation:	80dB or more
29. Overload Indicator:	25dB above nominal input level
30. Peak Indicator:	10dB above nominal output level
31. Dimensions (W × H × D):	802 × 240 × 798 mm (31-9/16" × 9-7/16" × 31-7/16")
32. Weight:	38kg (83-12/16 lbs) net
33. Power Requirements:	100/120/220/240V AC, 50/60Hz, 70W (General Export Model) 120V AC, 60Hz, 75W (U.S.A./Canada Model) 220V AC, 50Hz, 75W (Europe Model) 240V AC, 50Hz, 75W (U.K./Australia Model)

In these specifications, 0dBV is referenced to 1.0 volt, actual voltage levels are also given in parenthesis. To calculate the 0dB/0.775 volt reference level (i.e., 0dBm in a 600 ohm circuit) add 2.2dB to the listed value; i.e., –10dB re: 1V/–7.8dB re: 0.775V. Changes in specifications or features may be made without notice or obligation.

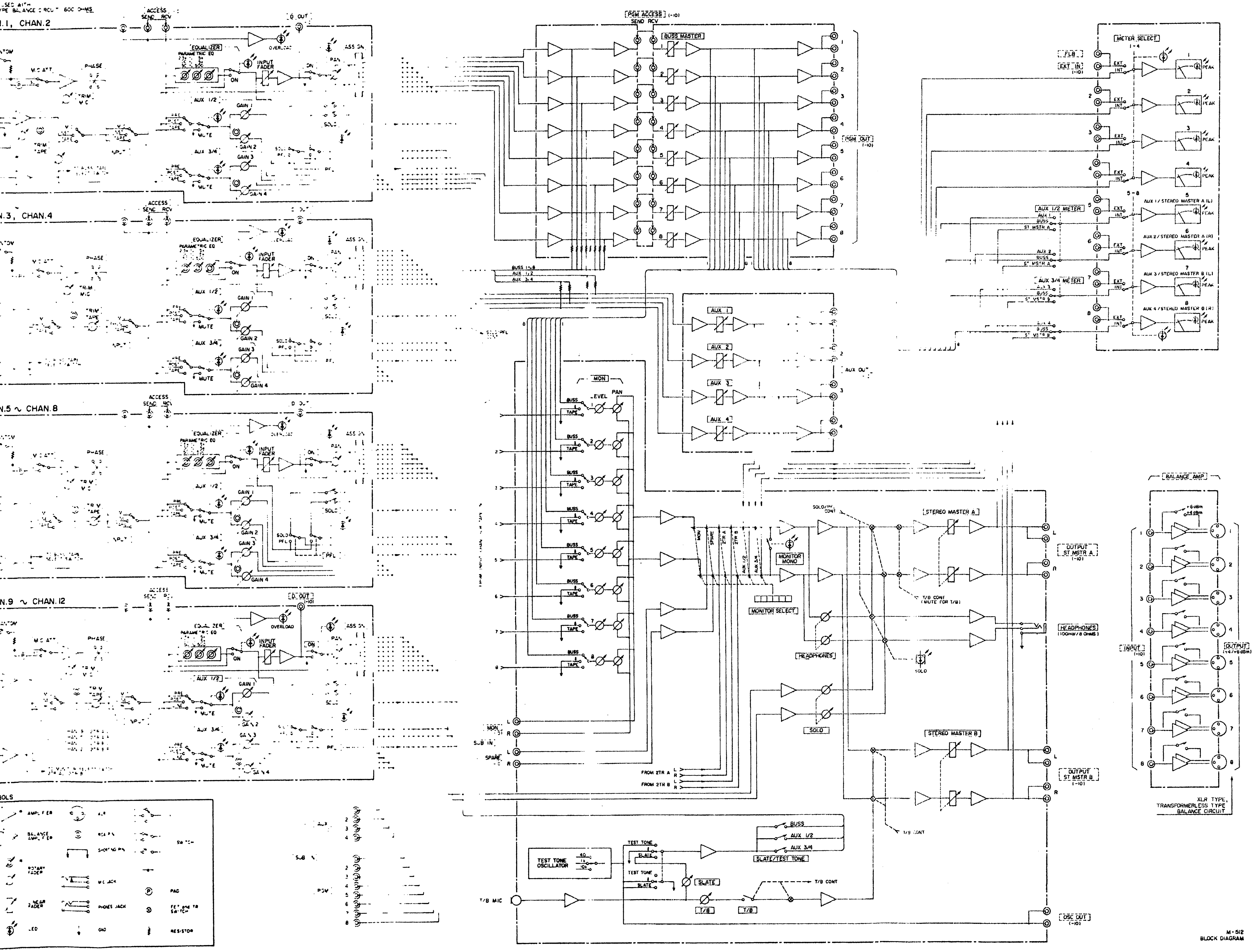
Harmonic Distortion (THD):	
nput to 1 PGM output	0.025% (at 1kHz, EQ OUT, nominal input level above 50dB and MIC ATT 30dB on, with 30kHz L.P.F. and 400Hz H.P.F. connected)
nput to 1 PGM output	0.02% (at 1kHz, EQ OUT, nominal input level, with 30kHz L.P.F. and 400Hz H.P.F. connected)
ermodulation Distortion (IMD), (SMPTE Method):	
nput to 1 buss output	0.06% (EQ OUT, nominal input level above 50dB and MIC ATT 30dB on)
nput ot 1 buss output	0.045% (EQ OUT, nominal input level)
Attenuation:	80dB or more
oad Indicator:	25dB above nominal input level
Indicator:	10dB above nominal output level
nsions (W x H x D):	802 x 240 x 798 mm (31-9/16" x 9-7/16" x 31-7/16")
nt:	38kg (83-12/16 lbs) net
r Requirements:	100/120/220/240V AC, 50/60Hz, 70W (General Export Model) 120V AC, 60Hz, 75W (U.S.A./Canada Model) 220V AC, 50Hz, 75W (Europe Model) 240V AC, 50Hz, 75W (U.K./Australia Model)

ecifications, 0dBV is referenced to 1.0 volt, ac- e levels are also given in parenthesis. To calcu- B/0.775 volt reference level (i.e., 0dBm in a 600 t) add 2.2dB to the listed value; i.e., −10dB re: re: 0.775V. Changes in specifications or fea- be made without notice or obligation.

M-512 BLOCK DIAGRAM


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT 600 OHMS
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
ACCESS
SEND RCV
D.OUT
PHANTOM POWER 48V
PHANTOM
MIC ATT
PHASE
TRIM
EQUALIZER
PARAMETRIC EQ
ON
INPUT FADER
OVERLOAD
ASSIGN
PAN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
MUTE
SOLO
PFL
PGM ACCESS
SEND RCV
BUSS MASTER
PGM OUT
BUSS 1~8
AUX 1/2
AUX 3/4
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT
MON
LEVEL
PAN
BUSS
TAPE
MON
SUB IN
SPARE
FROM 2TR L
FROM 2TR R
SOLO CONT
MONITOR MONO
MONITOR SELECT
HEADPHONES
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A
OUTPUT ST MSTR B
HEADPHONES
T/B CONT
SOLO
TEST TONE OSCILLATOR
TEST TONE
SLATE
SLATE/TEST TONE
BUSS
AUX 1/2
AUX 3/4
T/B
T/B MIC
OSC OUT
METER SELECT
FLB
EXT IN
EXT
INT
AUX 1/2 METER
AUX 3/4 METER
AUX 1 / STEREO MASTER A
AUX 2 / STEREO MASTER A
AUX 3 / STEREO MASTER B
AUX 4 / STEREO MASTER B
BALANCE AMP
INPUT
XL TRANSFORMERLESS BALANCE
SYMBOLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
XLR
RCA PIN
SHORTING PIN
MIC JACK
PHONES JACK
GND
SWITCH
PAD
FET and TR SWITCH
RESISTOR

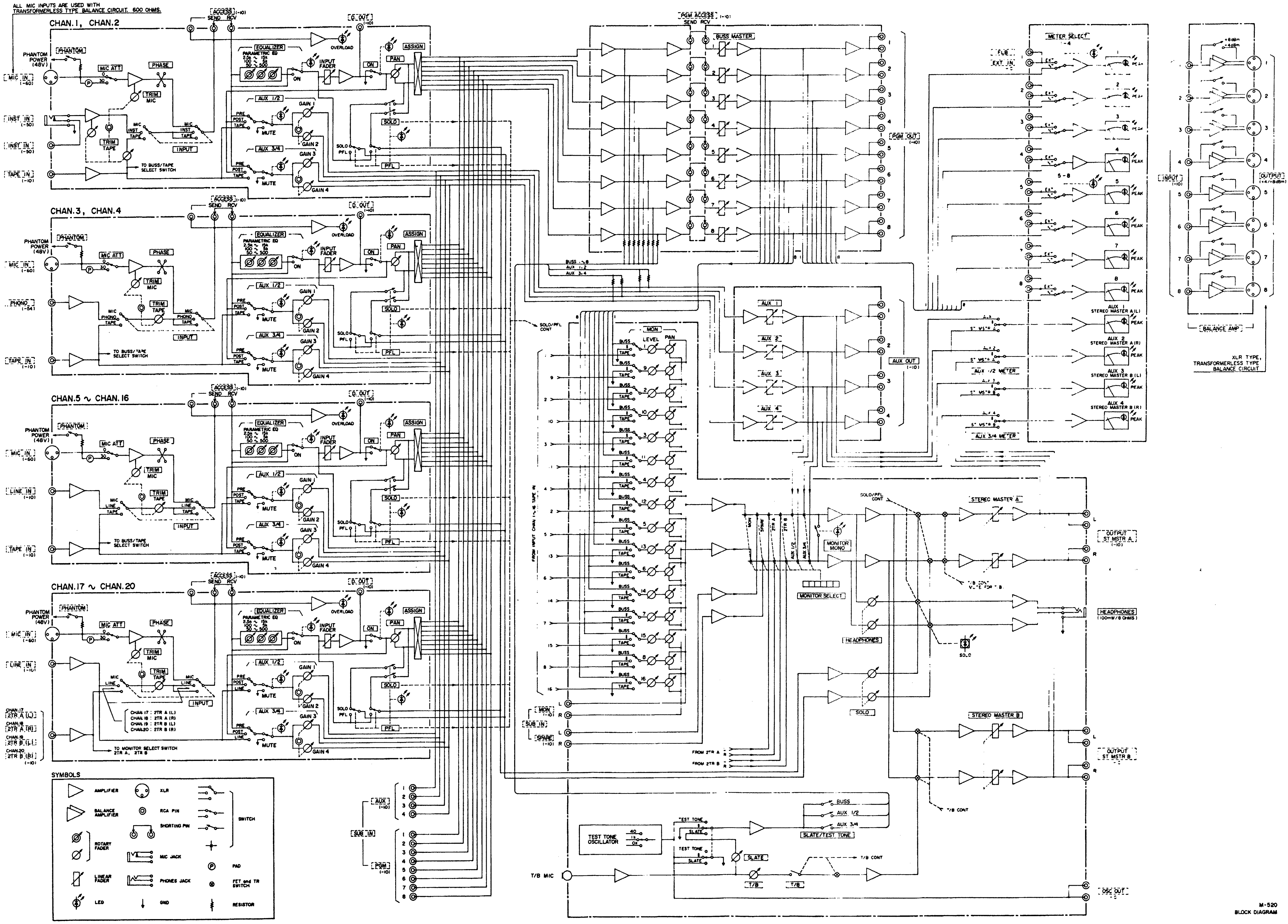
CK DIAGRAM



CHAN.1, CHAN.2
N.3, CHAN.4
N.5 ~ CHAN.8
N.9 ~ CHAN.12
ACCESS
SEND RCV
D OUT
OVERLOAD
EQUALIZER
PARAMETRIC EQ
INPUT FADER
ON
MIC ATT
PHASE
TRIM
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
MUTE
SOLO
PFL
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1/2
AUX 3/4
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT
MON
LEVEL
PAN
BUSS
TAPE
MON SUB IN
SPARE
FROM 2TR A
FROM 2TR B
MONITOR MONO
MONITOR SELECT
HEADPHONES
SOLO
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B (-10)
HEADPHONES (100mW/8 OHMS)
T/B CONT (MUTE FOR T/B)
TEST TONE OSCILLATOR
TEST TONE
SLATE
T/B
T/B MIC
T/B CONT
SLATE/TEST TONE
DSC OUT (-10)
METER SELECT
FLB
EXT IN (-10)
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
ST MSTR A
ST MSTR B
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
BALANCE AMP
INPUT (-10)
OUTPUT (+4/+8dBm)
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
OLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
MIC JACK
PHONES JACK
SWITCH
PAD
RESISTOR
GND
AUX
SUB IN
PGM

M-512
BLOCK DIAGRAM

M-520 BLOCK DIAGRAM


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN. 1, CHAN. 2
CHAN. 3, CHAN. 4
CHAN. 5 ∿ CHAN. 16
CHAN. 17 ∿ CHAN. 20
PHANTOM POWER (48V)
PHANTOM
MIC ATT
PHASE
TRIM
MIC IN (-60)
INST IN (-50)
PHONO (-54)
LINE IN (-10)
TAPE IN (-10)
INPUT
TO BUSS/TAPE SELECT SWITCH
ACCESS (-10) SEND RCV
D. OUT (-10)
OVERLOAD
EQUALIZER
PARAMETRIC EQ
INPUT FADER
ON
ASSIGN
PAN
AUX 1/2
AUX 3/4
PRE POST TAPE
MUTE
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
CHAN 17 : 2TR A (L)
CHAN 18 : 2TR A (R)
CHAN 19 : 2TR B (L)
CHAN 20 : 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
PGM ACCESS (-10) SEND RCV
BUSS MASTER
PGM OUT (-10)
BUSS 1-8
AUX 1-2
AUX 3-4
SOLO/PFL CONT
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN (TAPE IN)
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
METER SELECT
FLB
EXT IN
PEAK
AUX 1 STEREO MASTER A (L)
AUX 2 STEREO MASTER A (R)
AUX 3 STEREO MASTER B (L)
AUX 4 STEREO MASTER B (R)
AUX 1/2 METER
AUX 3/4 METER
INPUT (-10)
OUTPUT (+4/+8dBm)
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
OUTPUT ST MSTR B
MONITOR MONO
MONITOR SELECT
HEADPHONES
HEADPHONES (100mW/8 OHMS)
SOLO
MON IN (-10)
SUB IN
FROM 2TR A
FROM 2TR B
AUX (-10)
SUB IN
PGM (-10)
T/B CONT
TEST TONE OSCILLATOR
TEST TONE
SLATE
SLATE/TEST TONE
BUSS
AUX 1/2
AUX 3/4
T/B
T/B MIC
OSC OUT
SYMBOLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
XLR
RCA PIN
SHORTING PIN
MIC JACK
PHONES JACK
GND
SWITCH
PAD
FET and TR SWITCH
RESISTOR
M-520 BLOCK DIAGRAM

M-520 SPEC

1. 20-Input/8-PGM O
   4-AUX Output/16-
2. Input Selector:
   Channels 1,2
   Channels 3,4
   Channels 5–16
   Channel 17
   Channel 18
   Channel 19
   Channel 20
3. Mic Input (Low Im
   Mic Impedance

   Input Impedance

   Nominal Input Level
   Minimum Input Lev

   Maximum Input Lev

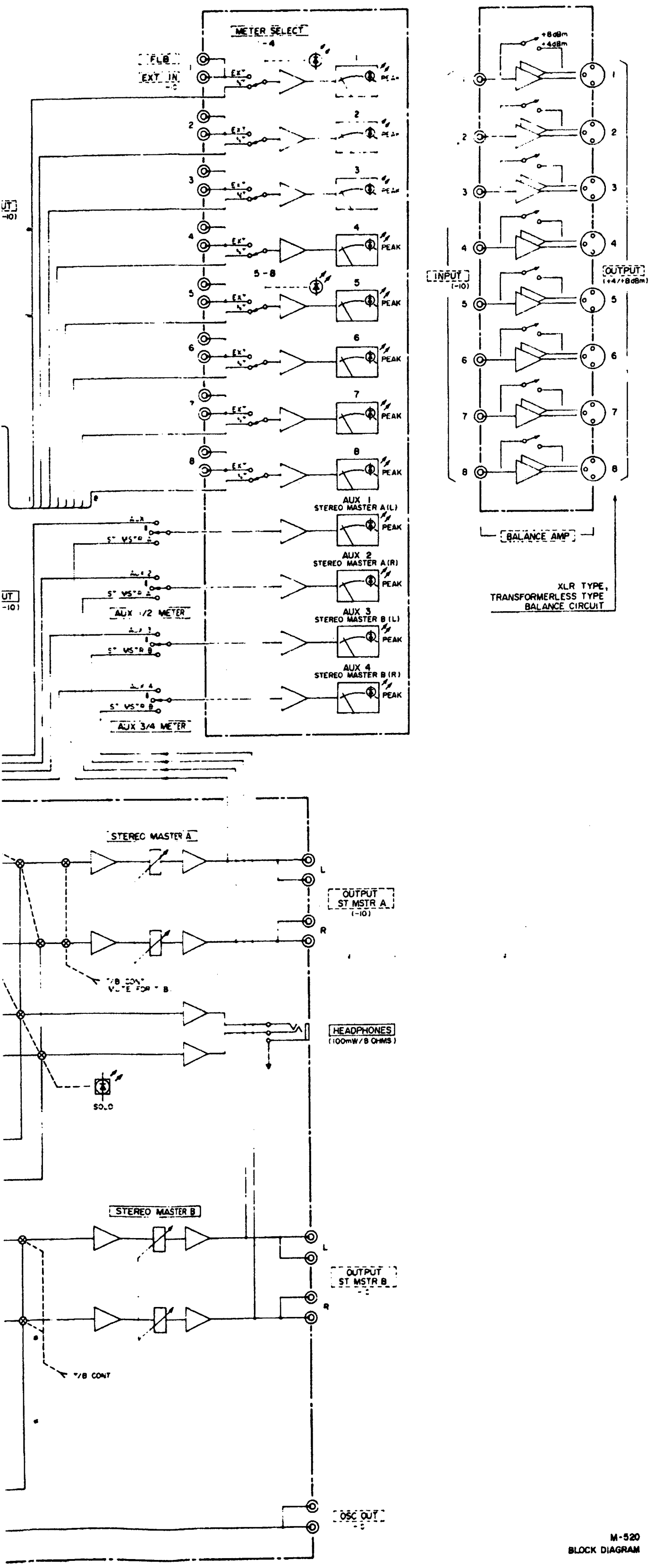
4. Instrument Input –
   Input Impedance
   Nominal Input Level
   Maximum Input Lev

   Minimum Input Lev

5. Tape Input (TAPE -
   2TR A/B – channel
   Input Impedance
   Nominal Input Level
   Maximum Input Lev
6. Phono Input – char
   Input Impedance
   Nominal Input Level
   Minimum Input Leve

   Maximum Input leve

7. Line Input – chann
   Input Impedance
   Nominal Input Level
   Maximum Input Lev
8. PGM/AUX 1, 2, 3,
   Output Impedance
   Minimum Load Impe
   Nominal Load Impec
   Nominal Output Lev
   Maximum Output Le



M-520 BLOCK DIAGRAM

M-520 SPECIFICATIONS

1. 20-Input/8-PGM Output/2-Monitor Output (x2)/ 4-AUX Output/16-Tape Monitor/8-Balanced Amp:

2. Input Selector:

Channels 1,2	MIC/INSTrument/TAPE
Channels 3,4	MIC/PHONO/TAPE
Channels 5-16	MIC/LINE/TAPE
Channel 17	MIC/LINE/2TR A (L)
Channel 18	MIC/LINE/2TR A (R)
Channel 19	MIC/LINE/2TR B (L)
Channel 20	MIC/LINE/2TR B (R)

3. Mic Input (Low Impedance) – channels 1–20:

Mic Impedance	200 to 600 ohms nominal (matched for mics of 600 ohms or less)
Input Impedance	2k ohms, balanced, XLR type equivalent
Nominal Input Level	–60dBV (1mV)
Minimum Input Level	–70dBV (0.3mV), MIC TRIM to max.
Maximum Input Level	+18dBV (8V), MIC ATT to 30dB, MIC TRIM to min.

4. Instrument Input – channels 1,2:

Input Impedance	100k ohms
Nominal Input Level	–50dBV (3mV)
Maximum Input Level	+10 dBV (3.15V), TAPE TRIM to min.
Minimum Input Level	–58dBV (1.3mV) TAPE TRIM to max.

5. Tape Input (TAPE – channels 1–16, 2TR A/B – channels 17–20):

Input Impedance	47k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

6. Phono Input – channels 3,4:

Input Impedance	47k ohms
Nominal Input Level	–54dBV (2mV) at 1kHz
Minimum Input Level	–62dBV (0.8mV) at 1kHz, TAPE TRIM to max.
Maximum Input level	–25dBV (56mV) at 1kHz, TAPE TRIM to min.

7. Line Input – channels 5–20:

Input Impedance	100k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

8. PGM/AUX 1, 2, 3, 4 Output:

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

9. Stereo Master A/B Output:

Output Impedancee	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

10. Balanced Amp Input [Separate type]:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+15dBV (5.6V)

11. Balanced Amp Output [Separate type]:

Nominal Load Impedance	600 ohm, balanced
Nominal Output Level	+4dBm (1.23V)/+8dBm (1.95V) switchable
Maximum Output Level	+28dBm (19.5V)

12. Direct Output:

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

13. Access Send Output (Input 1–12/Buss 1–8):

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	–10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

14. Access Receive Input (Input 1–20):

Input Impedance	220k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

15. Access Receive Input (Buss 1 – 8):

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

16. Program Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

17. Aux Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

18. Monitor Sub Input:

Input Impedance	22k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

19. Spare Sub Input:

Input Impedance	100k ohms
Nominal Input Level	–10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

20. Oscillator Output:

Frequency	40Hz/1kHz/10kHz switchable
Output Impedance	470 ohms
Nominal Output Level	–10dBV (0.3V)

21. Headphones Output:

Nominal Load Impedance	8 ohms
Maximum Output Power	Greater than 100mW, 8 ohms

22. Frequency Response: Line Input to –

PGM Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Aux Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Mon Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Headphones Output	50Hz – 20kHz ± 2dB (Reference 30kHz ± 3dB)

23. Equalizer:

Type	Sweep
Level	Boost/Cut ± 15dB
Frequency (Low)	50Hz to 500Hz
(Middle)	100Hz to 5kHz
(High)	2.5kHz to 15kHz

24. Signal to Noise Ratio (at nominal input levels, EQ out, UNWTD/"A" WTD):

1 line to 1 PGM output	86dB/87dB
16 lines to 1 PGM output	73dB/75dB
1 line to access send	90dB/92dB
1 line to direct output	88dB/90dB
1 tape to 1 PGM output	86dB/87dB
16 tape to 1 PGM output	73dB/75dB
1 tape to access send	90dB/92dB
1 tape to direct output	88dB/90dB
1 mic to 1 PGM output	68dB/70dB (150 ohm source)
20 mic to 1 PGM output	50dB/55dB (150 ohm source)
1 mic to access send	68dB/70dB (150 ohm source)
1 mic to direct output	68dB/70dB (150 ohm source)
1 inst to 1 PGM output	72dB/74dB
1 phono to 1 PGM output	65dB/68dB
Balanced output	90dB/95dB

25. Cross Talk:

	Better than 70dB (1kHz, nominal input level)
	Better than 60dB (15kHz, nominal input level)

26.
1
1
27.
1
1
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1V/-
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ATIONS

Monitor Output (x2)/
nitor/8-Balanced Amp:

MIC/INSTrument/TAPE
MIC/PHONO/TAPE
MIC/LINE/TAPE
MIC/LINE/2TR A (L)
MIC/LINE/2TR A (R)
MIC/LINE/2TR B (L)
MIC/LINE/2TR B (R)
) – channels 1–20:
00 to 600 ohms nominal
matched for mics of
00 ohms or less)
k ohms, balanced,
XLR type equivalent
60dBV (1mV)
70dBV (0.3mV),
MIC TRIM to max.
18dBV (8V),
MIC ATT to 30dB,
MIC TRIM to min.
s 1,2:
00k ohms
50dBV (3mV)
10 dBV (3.15V),
APE TRIM to min.
58dBV (1.3mV)
APE TRIM to max.
ls 1–16,
:
7k ohms
10dBV (0.3V)
18dBV (8V)
:
7k ohms
54dBV (2mV) at 1kHz
62dBV (0.8mV) at 1kHz,
APE TRIM to max.
25dBV (56mV) at 1kHz,
APE TRIM to min.
:
00k ohms
10dBV (0.3V)
18dBV (8V)
:
00 ohms
k ohms
0k ohms
10dBV (0.3V)
18dBV (8V)

9. Stereo Master A/B Output:

Output Impedancee	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	−10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

10. Balanced Amp Input [Separate type]:

Input Impedance	22k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+15dBV (5.6V)

11. Balanced Amp Output [Separate type]:

Nominal Load Impedance	600 ohm, balanced
Nominal Output Level	+4dBm (1.23V)/+8dBm (1.95V) switchable
Maximum Output Level	+28dBm (19.5V)

12. Direct Output:

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	−10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

13. Access Send Output (Input 1–12/Buss 1–8):

Output Impedance	100 ohms
Minimum Load Impedance	2k ohms
Nominal Load Impedance	10k ohms
Nominal Output Level	−10dBV (0.3V)
Maximum Output Level	+18dBV (8V)

14. Access Receive Input (Input 1–20):

Input Impedance	220k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

15. Access Receive Input (Buss 1 – 8):

Input Impedance	22k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

16. Program Sub Input:

Input Impedance	22k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

17. Aux Sub Input:

Input Impedance	22k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

18. Monitor Sub Input:

Input Impedance	22k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

19. Spare Sub Input:

Input Impedance	100k ohms
Nominal Input Level	−10dBV (0.3V)
Maximum Input Level	+18dBV (8V)

20. Oscillator Output:

Frequency	40Hz/1kHz/10kHz switchable
Output Impedance	470 ohms
Nominal Output Level	−10dBV (0.3V)

21. Headphones Output:

Nominal Load Impedance	8 ohms
Maximum Output Power	Greater than 100mW, 8 ohms

22. Frequency Response: Line Input to –

PGM Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Aux Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Mon Output	20Hz – 20kHz ± 1dB (Reference 30kHz $^{+1}_{-2}$dB)
Headphones Output	50Hz – 20kHz ± 2dB (Reference 30kHz ± 3dB)

23. Equalizer:

Type	Sweep
Level	Boost/Cut ± 15dB
Frequency (Low)	50Hz to 500Hz
(Middle)	100Hz to 5kHz
(High)	2.5kHz to 15kHz

24. Signal to Noise Ratio (at nominal input levels, EQ out, UNWTD/"A" WTD):

1 line to 1 PGM output	86dB/87dB
16 lines to 1 PGM output	73dB/75dB
1 line to access send	90dB/92dB
1 line to direct output	88dB/90dB
1 tape to 1 PGM output	86dB/87dB
16 tape to 1 PGM output	73dB/75dB
1 tape to access send	90dB/92dB
1 tape to direct output	88dB/90dB
1 mic to 1 PGM output	68dB/70dB (150 ohm source)
20 mic to 1 PGM output	50dB/55dB (150 ohm source)
1 mic to access send	68dB/70dB (150 ohm source)
1 mic to direct output	68dB/70dB (150 ohm source)
1 inst to 1 PGM output	72dB/74dB
1 phono to 1 PGM output	65dB/68dB
Balanced output	90dB/95dB

25. Cross Talk:	Better than 70dB (1kHz, nominal input level) Better than 60dB (15kHz, nominal input level)

26. Total Harmonic Distortion (THD):

1 mic input to 1 PGM output	0.025% (at 1kHz, EQ OUT, nominal input level above 50dB and MIC ATT 30dB on, with 30kHz L.P.F. and 400Hz H.P.F. connected)
1 line input to 1 PGM output	0.02% (at 1kHz, EQ OUT, nominal input level, with 30kHz L.P.F. and 400Hz H.P.F. connected)

27. Intermodulation Distortion (IMD), (SMPTE Method):

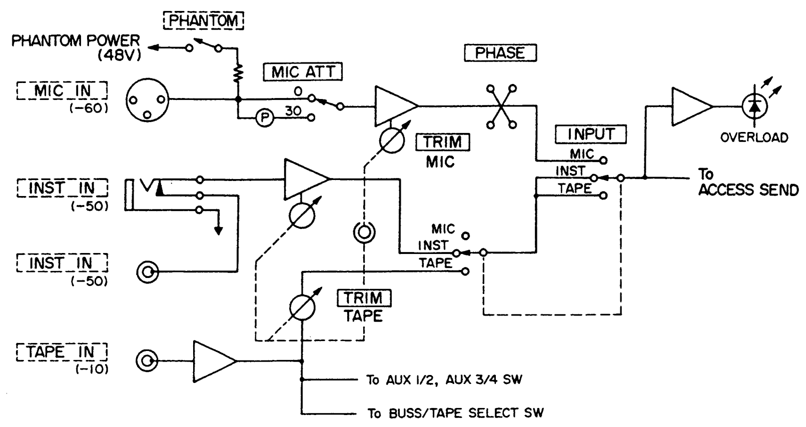
1 mic input to 1 PGM output	0.06% (EQ OUT, nominal input level above 50dB and MIC ATT 30dB on)
1 line input ot 1 PGM output	0.045% (EQ OUT, nominal input level)

28. Fader Attenuation:	80dB or more
29. Overload Indicator:	25dB above nominal input level
30. Peak Indicator:	10dB above nominal output level
31. Dimensions (W × H × D):	1082 × 240 × 798 mm (42-15/16" × 9-7/16" × 31-7/16")
32. Weight:	47kg (103-10/16 lbs) net
33. Power Requirements:	100/120/220/240V AC, 50/60Hz, 90W (General Export Model) 120V AC, 60Hz, 95W (U.S.A./Canada Model) 220V AC, 50Hz, 95W (Europe Model) 240V AC, 50Hz, 95W (U.K./Australia Model)

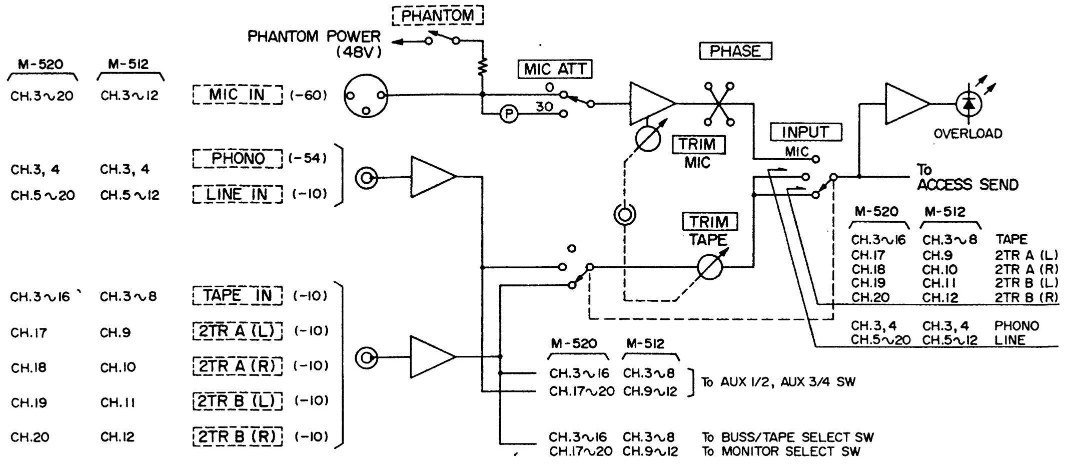
In these specifications, 0dBV is referenced to 1.0 volt, actual voltage levels are also given in parenthesis. To calculate the 0dB/0.775 volt reference level (i.e., 0dBm in a 600 ohm circuit) add 2.2dB to the listed value; i.e., −10dB re: 1V/−7.8dB re: 0.775V. Changes in specifications or features may be made without notice or obligation.

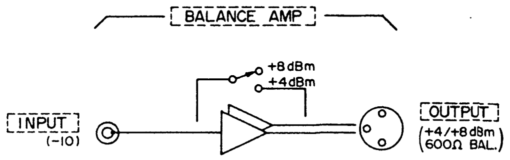
LEVEL DIAGRAM

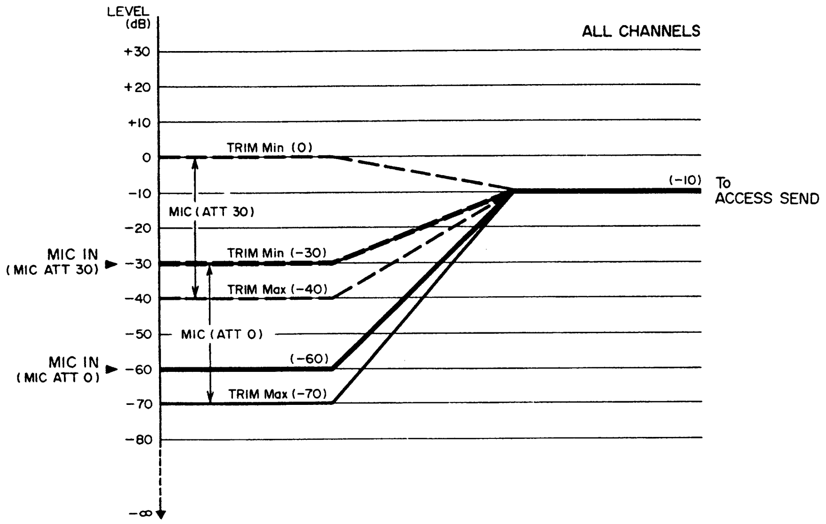
CHAN.1, 2 (M-520)
CHAN.1, 2 (M-512)

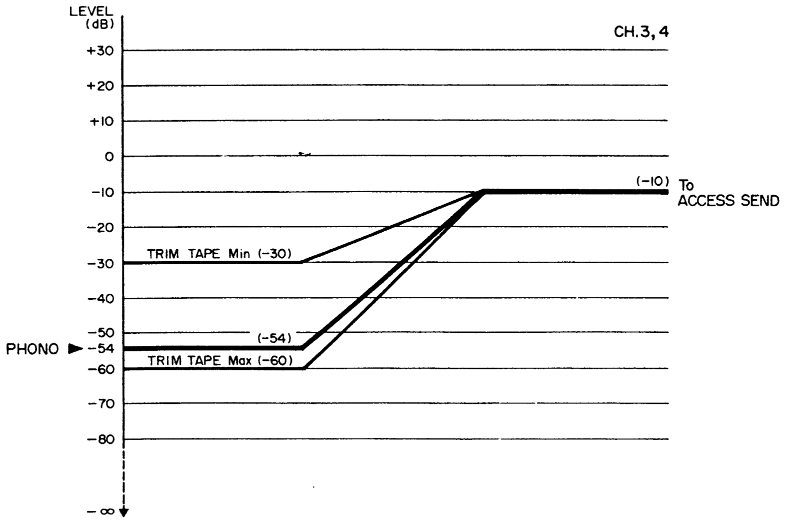

PHANTOM
PHANTOM POWER (48V)
MIC IN (-60)
MIC ATT
0
30
P
PHASE
TRIM MIC
INPUT
MIC
INST
TAPE
OVERLOAD
To ACCESS SEND
INST IN (-50)
INST IN (-50)
MIC
INST
TAPE
TRIM TAPE
TAPE IN (-10)
To AUX 1/2, AUX 3/4 SW
To BUSS/TAPE SELECT SW

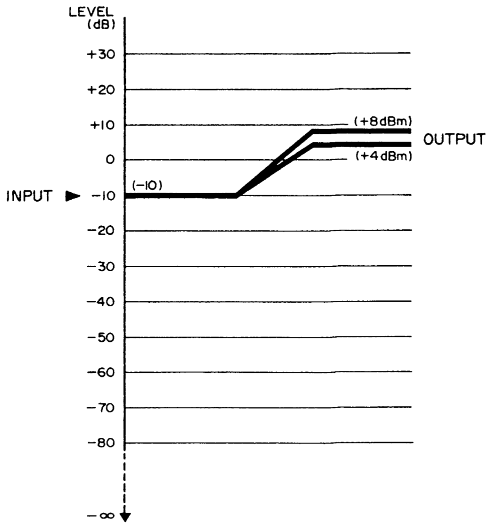
CHAN.3∿20 (M-520)
CHAN.3∿12 (M-512)

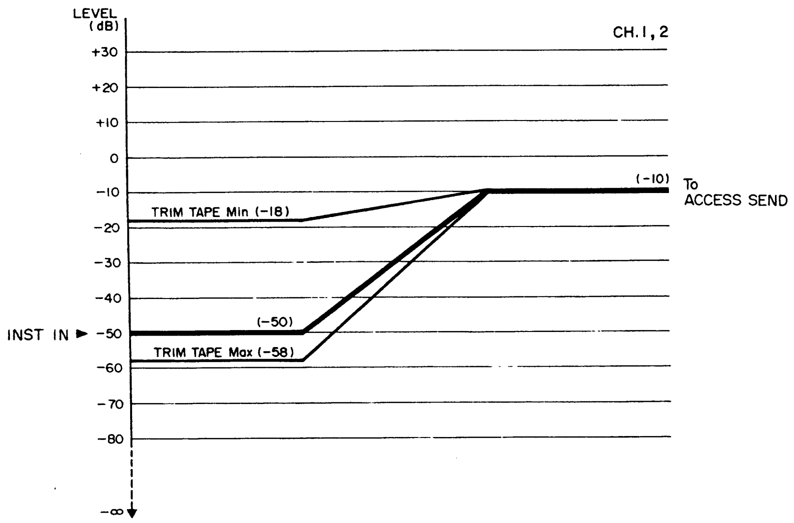

M-520
M-512
CH.3∿20
CH.3∿12
MIC IN (-60)
PHANTOM
PHANTOM POWER (48V)
MIC ATT
0
30
P
PHASE
TRIM MIC
OVERLOAD
INPUT
MIC
To ACCESS SEND
CH.3, 4
CH.5∿20
CH.3, 4
CH.5∿12
PHONO (-54)
LINE IN (-10)
TRIM TAPE
M-520
M-512
CH.3∿16
CH.17
CH.18
CH.19
CH.20
CH.3∿8
CH.9
CH.10
CH.11
CH.12
TAPE
2TR A (L)
2TR A (R)
2TR B (L)
2TR B (R)
CH.3, 4
CH.5∿20
CH.3, 4
CH.5∿12
PHONO
LINE
CH.3∿16
CH.17
CH.18
CH.19
CH.20
CH.3∿8
CH.9
CH.10
CH.11
CH.12
TAPE IN (-10)
2TR A (L) (-10)
2TR A (R) (-10)
2TR B (L) (-10)
2TR B (R) (-10)
M-520
M-512
CH.3∿16 CH.3∿8
CH.17∿20 CH.9∿12
To AUX 1/2, AUX 3/4 SW
CH.3∿16 CH.3∿8
CH.17∿20 CH.9∿12
To BUSS/TAPE SELECT SW
To MONITOR SELECT SW

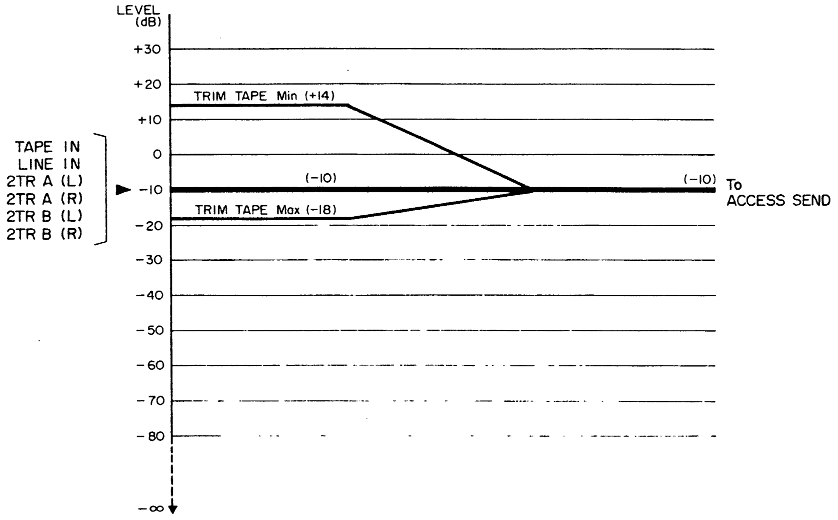

BALANCE AMP
INPUT (-10)
+8dBm
+4dBm
OUTPUT (+4/+8dBm) (600Ω BAL.)

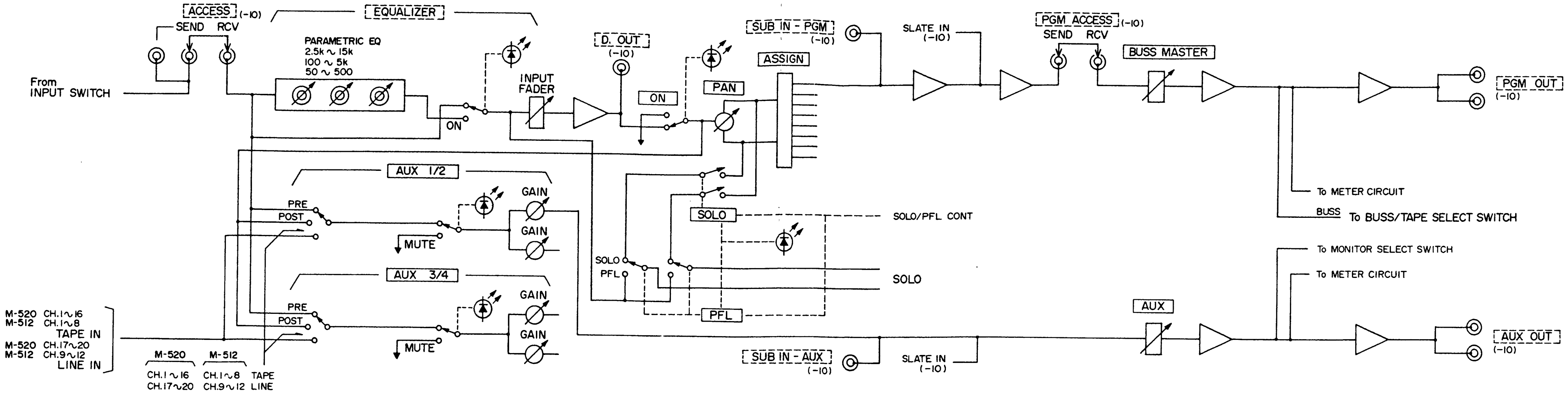


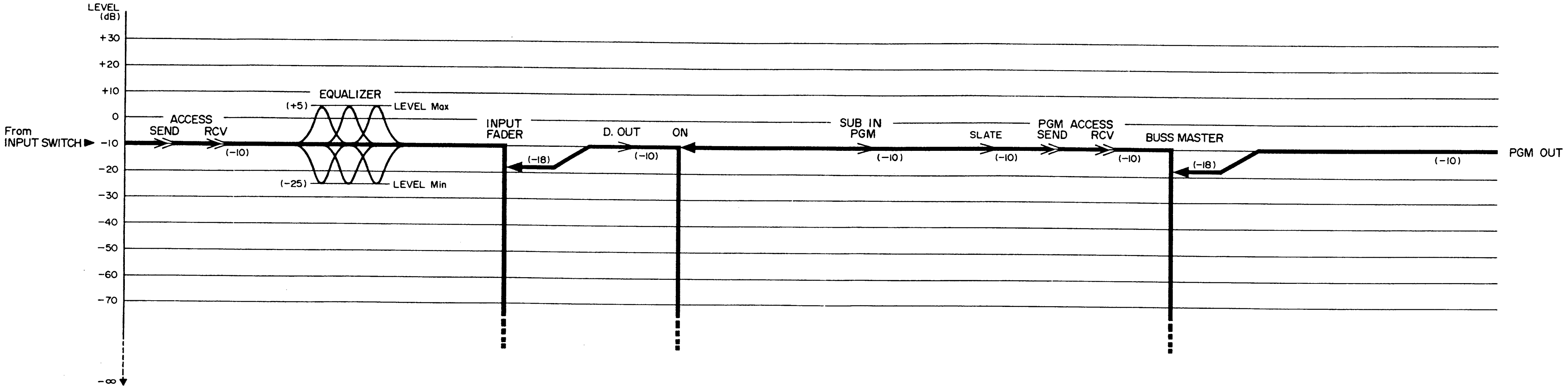


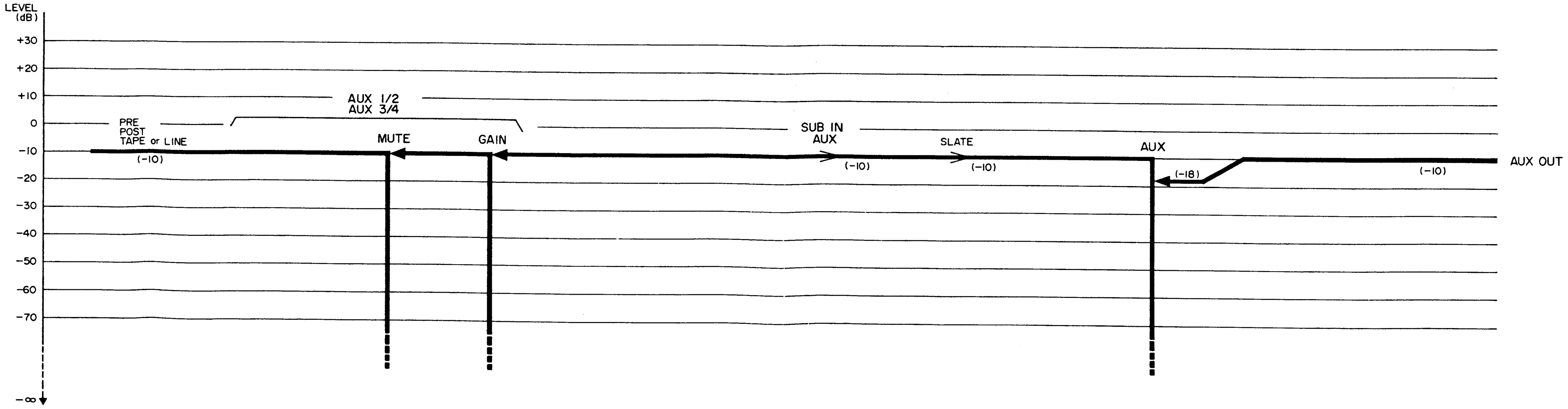


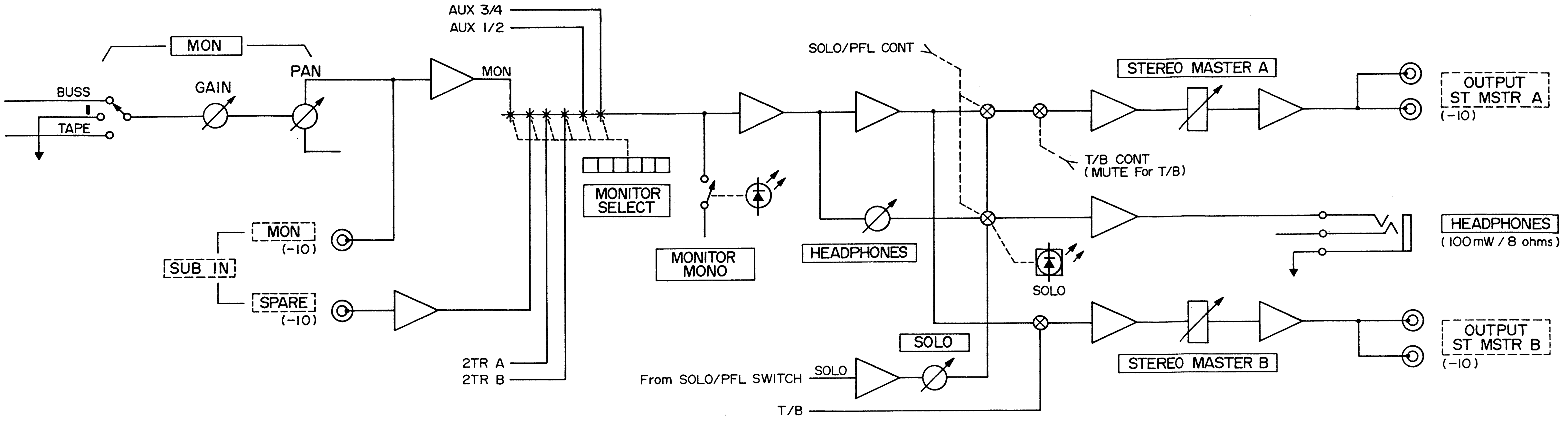


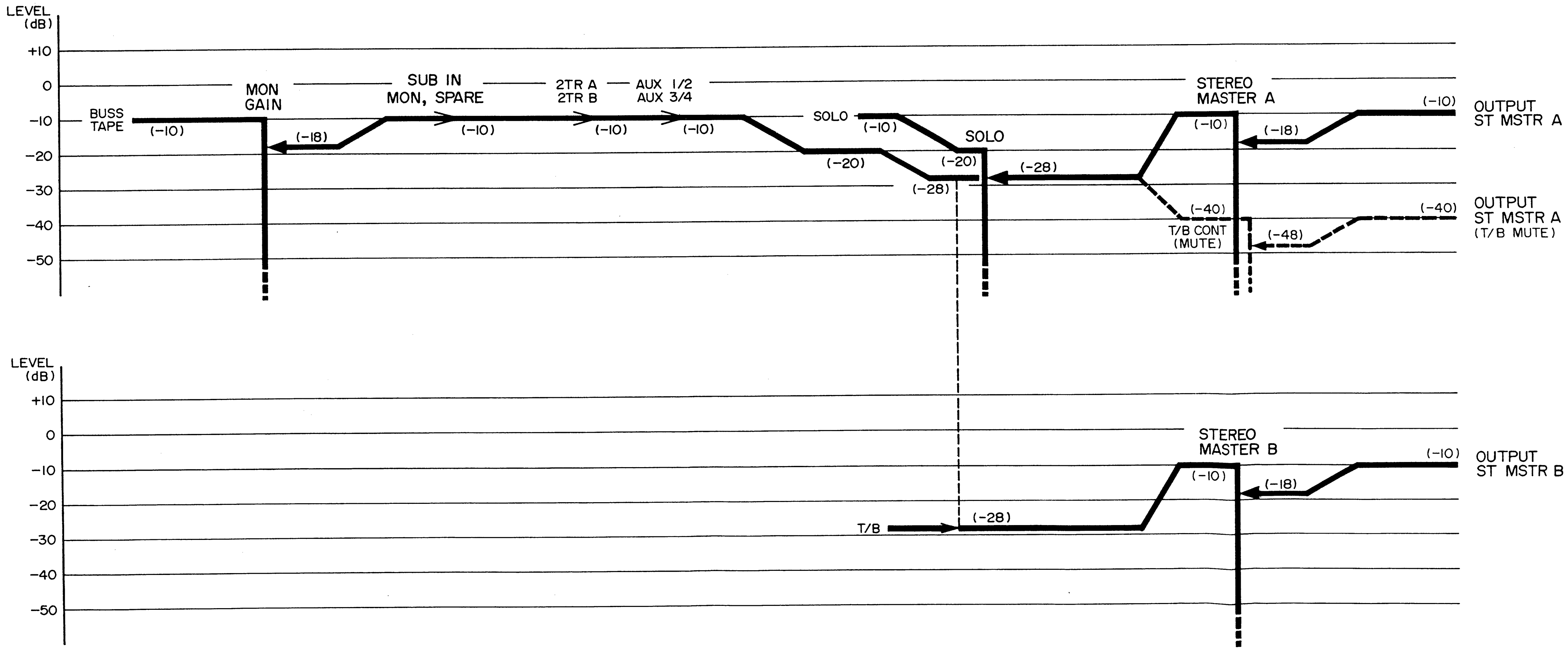



ACCESS (-10)
SEND RCV
From INPUT SWITCH
EQUALIZER
PARAMETRIC EQ
2.5k ~ 15k
100 ~ 5k
50 ~ 500
ON
INPUT FADER
D. OUT (-10)
ON
PAN
SUB IN - PGM (-10)
ASSIGN
SLATE IN (-10)
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
To METER CIRCUIT
BUSS To BUSS/TAPE SELECT SWITCH
To MONITOR SELECT SWITCH
To METER CIRCUIT
AUX
AUX OUT (-10)
AUX 1/2
PRE
POST
GAIN
GAIN
MUTE
AUX 3/4
PRE
POST
GAIN
GAIN
MUTE
SOLO
SOLO/PFL CONT
SOLO
PFL
SOLO
PFL
M-520 CH.1~16
M-512 CH.1~8
TAPE IN
M-520 CH.17~20
M-512 CH.9~12
LINE IN
M-520 M-512
CH.1~16 CH.1~8 TAPE
CH.17~20 CH.9~12 LINE
SUB IN - AUX (-10)
SLATE IN (-10)


LEVEL (dB)
+30
+20
+10
0
-10
-20
-30
-40
-50
-60
-70
-∞
From INPUT SWITCH
ACCESS
SEND RCV
(-10)
EQUALIZER
(+5)
LEVEL Max
(-25)
LEVEL Min
INPUT FADER
(-18)
D. OUT
(-10)
ON
SUB IN PGM
(-10)
SLATE
(-10)
PGM ACCESS
SEND RCV
(-10)
BUSS MASTER
(-18)
(-10)
PGM OUT


LEVEL (dB)
+30
+20
+10
0
-10
-20
-30
-40
-50
-60
-70
-∞
PRE
POST
TAPE or LINE
(-10)
AUX 1/2
AUX 3/4
MUTE
GAIN
SUB IN AUX
(-10)
SLATE
(-10)
AUX
(-18)
(-10)
AUX OUT


MON
GAIN
PAN
BUSS
TAPE
AUX 3/4
AUX 1/2
MON
MONITOR SELECT
MONITOR MONO
MON (-10)
SUB IN
SPARE (-10)
2TR A
2TR B
SOLO/PFL CONT
HEADPHONES
SOLO
From SOLO/PFL SWITCH
SOLO
T/B
T/B CONT (MUTE For T/B)
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A (-10)
HEADPHONES (100mW / 8 ohms)
OUTPUT ST MSTR B (-10)


LEVEL (dB)
+10
0
-10
-20
-30
-40
-50
BUSS
TAPE
(-10)
MON GAIN
(-18)
SUB IN MON, SPARE
(-10)
2TR A 2TR B
(-10)
AUX 1/2 AUX 3/4
(-10)
(-20)
(-28)
SOLO
(-10)
(-20)
SOLO
(-28)
STEREO MASTER A
(-10)
(-18)
(-10)
OUTPUT ST MSTR A
(-40)
T/B CONT (MUTE)
(-48)
(-40)
OUTPUT ST MSTR A (T/B MUTE)
LEVEL (dB)
+10
0
-10
-20
-30
-40
-50
T/B
(-28)
STEREO MASTER B
(-10)
(-18)
(-10)
OUTPUT ST MSTR B

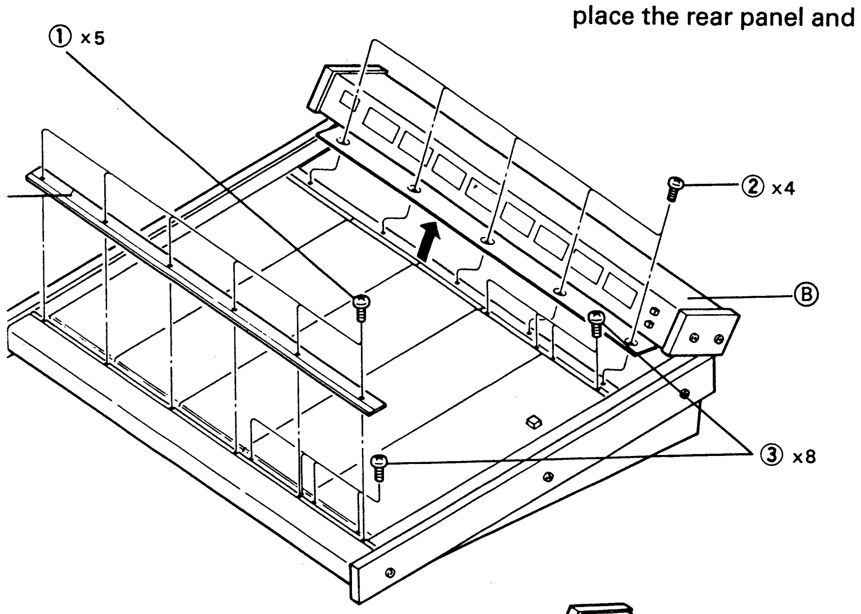
LTAGE CONVERSION

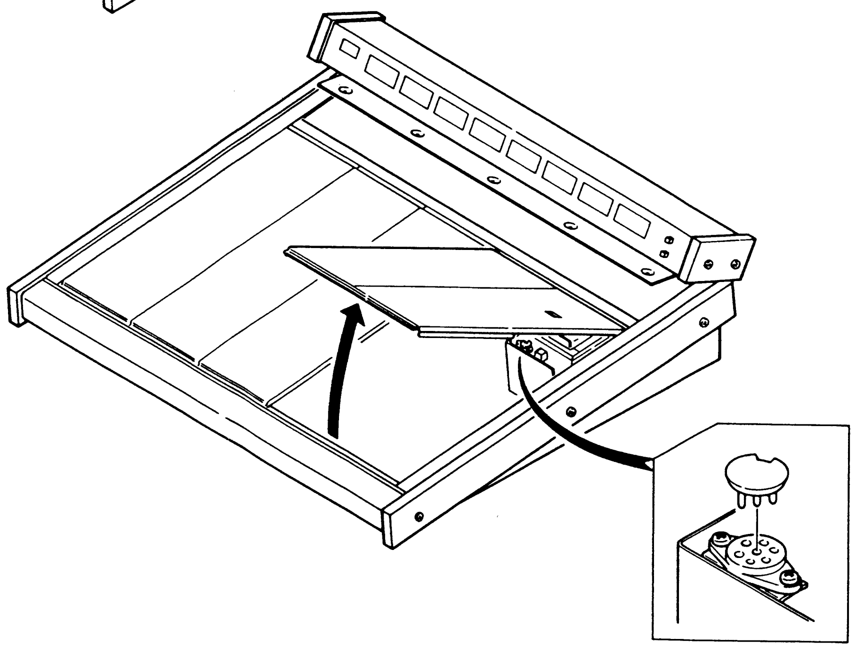
nixer is adjusted to operate on the elec-
ıltage specified on the packing carton.

This voltage conversion is not possible
ɔdel sold in the U.S.A. and Canada, U.K.,
ılia or Europe.
ɜneral export units, if it is necessary to
e the voltage requirements of this mixer
tch your area, use the following proce-
Always disconnect Power Line Cord be-
ıaking these changes.

Conversion Procedures for M-512

1. Remove five screws ① to remove number plate Ⓐ.
2. Remove four screws ②, then tilt the rear panel by pushing back meter bridge Ⓑ.
3. Remove eight screws ③ which fasten the monitor/talkback panel to the main frame.
4. Lift up the front edge of the monitor/talkback panel.
5. The voltage selector plug is located near the power switch and transformer inside the unit.
6. Pull out the plug and reinsert it so that the desired voltage can be read through the cut-out window of the plug.
7. Replace the monitor/talkback panel, then replace the rear panel and the number plate.

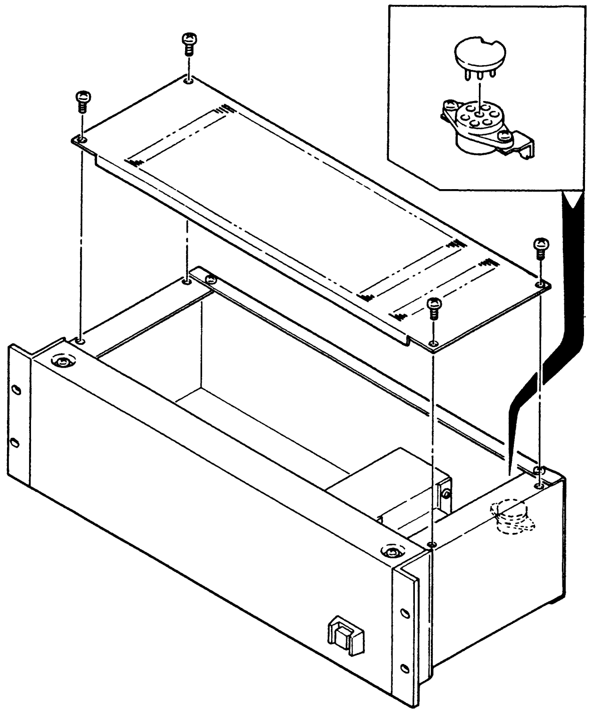




Conversion Procedures for M-520

Always disconnect Power Line Cord of the PS-520 Power Supply Unit of the M-520 before making these changes.

1. Remove four screws to remove the cover of the PS-520.
2. The voltage selector plug is located near the power transformer inside of the PS-520.
3. Pull out the plug and reinsert it so that the desired voltage can be rear through the cut-out window of the plug.
4. Replace the cover.



NOTE FOR U.K. CUSTOMERS

U.K. Customers Only: Due to the variety of plugs being used in the U.K., this unit is sold without an AC plug. Please request your dealer to install the correct plug to match the mains power outlet where your unit will be used as per these instructions.

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

BLUE: NEUTRAL
BROWN: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured makings identifying the terminals of your plug, proceed as follows.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

MAINTENANCE

NOTES

- * All procedures refer to all inputs and outputs within the circuit or system discussed. For convenience, the procedures are described referring to a single input-output chain, but must be followed for all inputs and outputs of the circuit or system being discussed, unless expressly stated otherwise.
- * All resistors are 1/4 watt, 5%, unless marked otherwise. Resistor values are in ohms (k=1,000 ohms, M=1,000,000 ohms).
- * All capacitor values are in microfarads (p=picofarads).
- * ⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components-refer to the TEAC Parts List and ensure exact replacement.
- * 0 dB is referenced to 1 V in this manual unless otherwise specified.
- * PC boards shown viewed from component side.

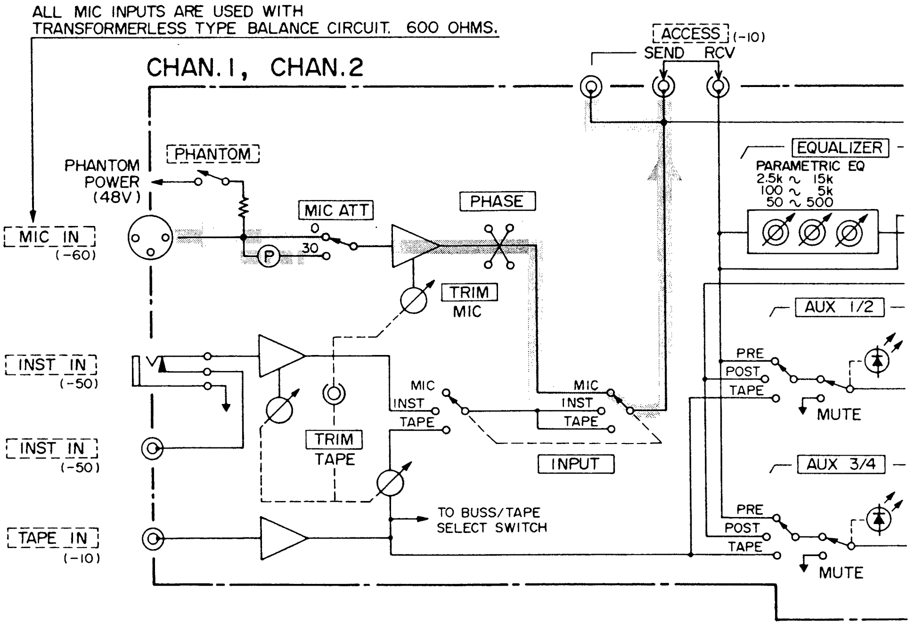
INSTRUCTIONS FOR SERVICE PERSONNEL

BEFORE RETURNING APPLIANCE TO THE CUSTOMER, MAKE LEAKAGECURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

1. LEVEL SETTING AND OPERATION CHECK

1-1. MIC IN → ACCESS SEND

1. In the MIC IN connector, pin #3 is "hot", pin # 2 is"cold", and pin # 1 is "shield".
2. Remove the jumper between the ACCESS SEND and the RCV jacks for the channel being tested.
3. Plug an AC voltmeter into the ACCESS SEND jack. The voltmeter should have an input impedance of 50k ohms or more, input capacitance less than 20pF, a sensitivity selector switch and a maximum sensitivity of –90dB.
4. Set the front panel control for the channel being tested as follows:
   INPUT select switch : Set to MIC
   MIC ATT switch : Set to 0
   PHASE switch : Set to NORM
   PHANTOM power switch: Set to OFF
5. Apply a 1kHz, –60dB (1mV) signal to the MIC IN connector on the back panel.
6. Adjust the MIC TRIM for a –10dB (316mV) reading on the voltmeter. After this adjustment, the MIC TRIM knob should be between 6.5 and 7.5 (between 1 : 30 and 2 : 30 o'clock).
7. If there is any malfunction, refer to the preamplifier (Q1 ~ Q4 and U1) circuit schematic and check the IC and transistor voltages and signal levels.
8. Check all remaining channels in the same manner.
9. Set the MIC ATT switch to 30 and apply a 1kHz, –30 dB (31.6mV) signal to the MIC IN connector on the back panel.
10. If the output is not –10dB (316mV), readjust the MIC TRIM for a –10dB (316mV) reading on the voltmeter. After this adjustment, the MIC TRIM knob should be between 6.5 and 7.5.
11. Measurement of S/N ratio, T.H.D.:
    S/N ratio : More than 70dB (using "A" weighted network)
    or : 68dB (measured with a bandpass filter, 20Hz ~ 20kHz)
    T.H.D. : Less than 0.025% (at 1kHz, 20dB above nominal input level measured with 30kHz L.P.F.)
12. Set the PHASE switch to REV.
    Confirm that the phase of the output signal is inverted using an oscilloscope connected to the ACCESS SEND jack.


ALL MIC INPUTS ARE USED WITH
TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN. 1, CHAN. 2
ACCESS (–10)
SEND
RCV
PHANTOM
PHANTOM POWER (48V)
MIC ATT
0
30
P
PHASE
MIC IN (–60)
TRIM MIC
EQUALIZER
PARAMETRIC EQ
2.5k ~ 15k
100 ~ 5k
50 ~ 500
AUX 1/2
PRE
POST
TAPE
MUTE
INST IN (–50)
INST IN (–50)
MIC
INST
TAPE
MIC
INST
TAPE
TRIM TAPE
INPUT
AUX 3/4
PRE
POST
TAPE
MUTE
TO BUSS/TAPE SELECT SWITCH
TAPE IN (–10)

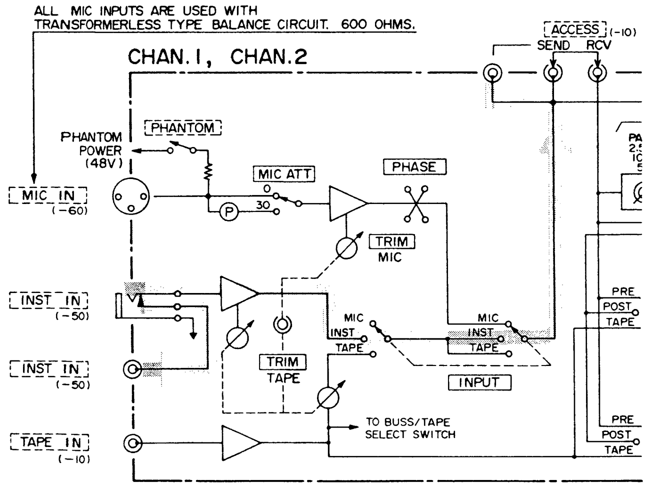
1-2. INST IN → ACCESS SEND for Channels 1 and 2

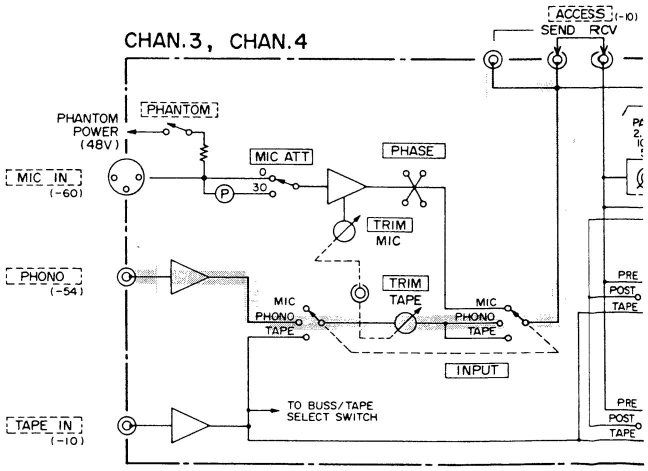
1. Use same test set up as previous section 1-1.
2. Apply a 1kHz, –50dB (3.16mV) signal to the INST IN (phono or phone jack) on the back panel and set INPUT select switch to INST.
3. Adjust the TAPE TRIM for –10dB (316mV) reading on the voltmeter. After this adjustment, the TAPE TRIM knob should be between 6.5 and 7.5.
4. If there is any malfunction, refer to the preamplifier (U1) circuit schematic and check the IC voltages and signal levels.
5. Check channel 2 in the same manner.
6. Measurement of S/N ratio:

S/N ratio	: More than 74dB (using "A" weighted network)
or	: 72dB (measured with a bandpass filter, 20Hz ~ 20kHz)

1-3. PHONO IN → ACCESS SEND for Channels 3 and 4

1. Use same test set up as previous section 1-1.
2. Apply a 1kHz, –54dB (2mV) signal to the PHONO jack on the back panel and set the INPUT select switch to PHONO.
3. Adjust the TAPE TRIM for a –10dB (316mV) reading on the voltmeter. After this adjustment, the TAPE TRIM knob should be between 6.5 and 7.5.
4. If there is any malfunction, refer to the preamplifier (U1) circuit schematic and check the IC voltages and signal levels.
5. Check channel 4 in the same manner.
6. The circuit is considered normal if the frequency response is +17dB, ± 1dB for 50Hz; and –13.5dB, ± 1dB for 10kHz; both in reference to 1kHz when the signal frequency applied to the PHONO input is swept from 50Hz through 10kHz.
7. Short-circuit the PHONO input. The S/N ratio should then be greater than 65dB (in the range of 20Hz ~ 20kHz).


ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN. 1, CHAN. 2
ACCESS (-10)
SEND RCV
PHANTOM POWER (48V)
PHANTOM
MIC ATT
0
30
P
PHASE
MIC IN (-60)
TRIM MIC
INST IN (-50)
INST IN (-50)
TRIM TAPE
MIC
INST
TAPE
MIC
INST
TAPE
INPUT
TO BUSS/TAPE SELECT SWITCH
TAPE IN (-10)
PRE
POST
TAPE
PRE
POST
TAPE


CHAN. 3, CHAN. 4
ACCESS (-10)
SEND RCV
PHANTOM POWER (48V)
PHANTOM
MIC ATT
0
30
P
PHASE
MIC IN (-60)
TRIM MIC
PHONO (-54)
TRIM TAPE
MIC
PHONO
TAPE
MIC
PHONO
TAPE
INPUT
TO BUSS/TAPE SELECT SWITCH
TAPE IN (-10)
PRE
POST
TAPE
PRE
POST
TAPE

1-4 LINE IN → ACCESS SEND
for Channels 5 through 12 (M-512) or 20 (M-520)

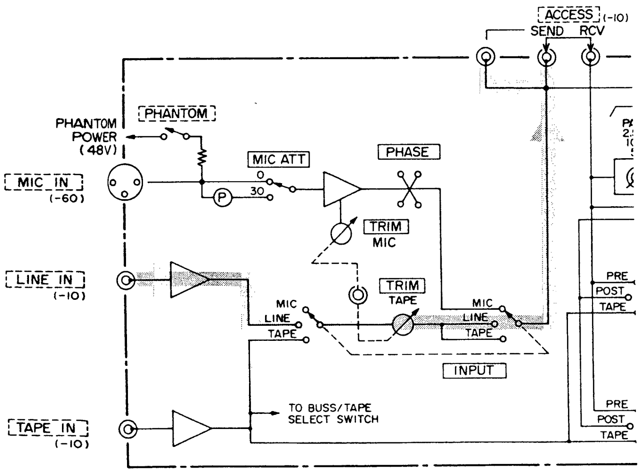
1. Use same test set up as previous section 1-1.
2. Apply a 1kHz, –10dB (316mV) signal to the LINE IN jack on the back panel and set the INPUT select switch to LINE.
3. Adjust the TAPE TRIM for a –10dB (316mV) reading on the AC voltmeter. After this adjustment, the TAPE TRIM knob should be between 6.5 and 7.5.
4. If there is any malfunction, refer to the preamplifier (U3) circuit schematic and check the IC voltages and signal levels.
5. Check all remaining channels in the same manner.
6. Measurement of frequency response, S/N ratio, T.H.D.:

Frequency response	:	20Hz ~ 20 kHz, within ±1dB
S/N ratio	:	More than 92dB (using "A" weighted network)
or	:	90dB (measured with a bandpass filter, 20Hz ~ 20kHz)
T.H.D.	:	Less than 0.02% (at 1kHz, measured with 30kHz L.P.F.)

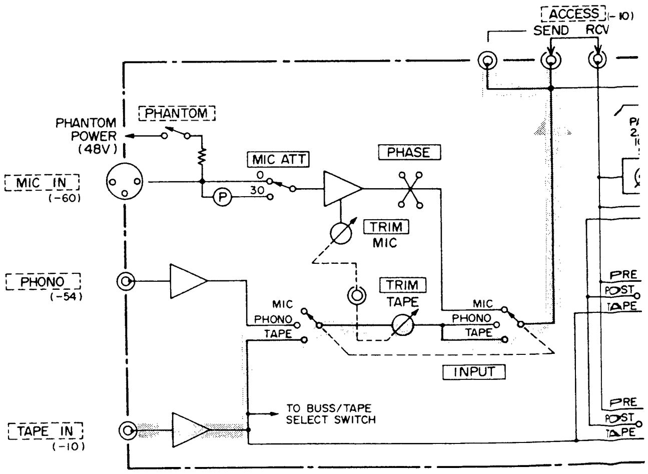
1-5. TAPE IN [2TR A&B (L/R)] → ACCESS SEND

1. Use same test set up previous section 1-1.
2. Apply a 1kHz, –10dB (316mV) signal to the TAPE IN or 2TR A (L/R) or 2TR B (L/R) jack on the back panel and set the INPUT select switch as appropriate to TAPE or 2TR A (L/R) or 2TR B (L/R).
3. Adjust the TAPE TRIM for a –10dB (316mV) reading on the voltmeter. After this adjustment, the TAPE TRIM knob should be between 6.5 and 7.5.
4. If there is any malfunction, refer to the preamplifier (U2) circuit schematic and check the IC voltages and signal levels.
5. Check all remaining channels in the same manner.
6. Measurement of frequency response, S/N ratio, T.H.D.:

Frequency response	:	20 Hz ~ 20 kHz, within ±1 dB
S/N ratio	:	More than 92dB (using "A" weighted network)
or	:	90dB (measured with a bandpass filter, 20Hz ~ 20kHz)
T.H.D.	:	Less than 0.025% (at 1kHz, measured with 30kHz L.P.F.)



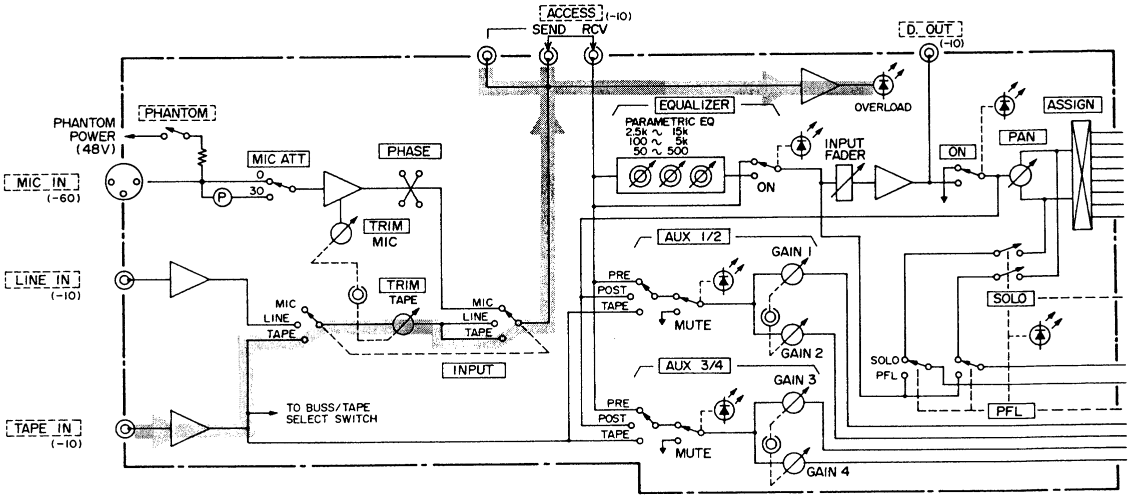
ACCESS (-10)
SEND
RCV
PHANTOM POWER (48V)
PHANTOM
MIC ATT
0
30
P
PHASE
MIC IN (-60)
TRIM MIC
LINE IN (-10)
TRIM TAPE
MIC
LINE
TAPE
MIC
LINE
TAPE
INPUT
PRE
POST
TAPE
TO BUSS/TAPE SELECT SWITCH
PRE
POST
TAPE
TAPE IN (-10)



ACCESS (-10)
SEND
RCV
PHANTOM POWER (48V)
PHANTOM
MIC ATT
0
30
P
PHASE
MIC IN (-60)
TRIM MIC
PHONO (-54)
TRIM TAPE
MIC
PHONO
TAPE
MIC
PHONO
TAPE
INPUT
PRE
POST
TAPE
TO BUSS/TAPE SELECT SWITCH
PRE
POST
TAPE
TAPE IN (-10)

1-6. Input Section Overload LED

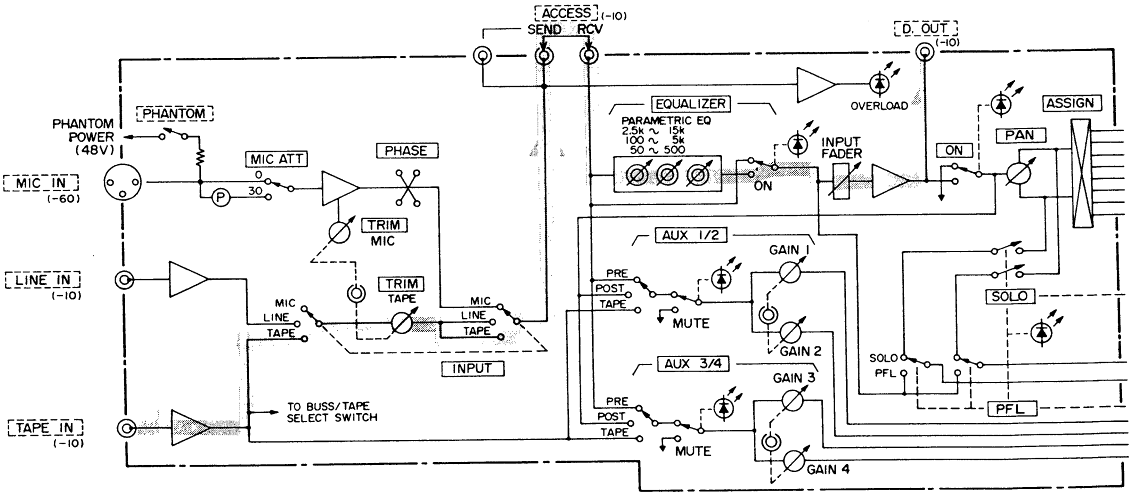
1. Apply a −10dB (316mV) signal to the TAPE IN or 2 TR A (L/R) or 2 TR B (L/R) jack on the back panel.
2. Plug an AC voltmeter into the ACCESS SEND jack and check the output level for a −10dB (316mV) reading on the voltmeter.
3. The LED should light at +15dB ± 1 dB (5.0V to 6.3V), 25dB ± 1 dB above the nominal ACCESS SEND level of −10dB (316mV).
4. Confirm that the output signal is not distorted.


ACCESS (−10)
SEND
RCV
D. OUT (−10)
PHANTOM POWER (48V)
PHANTOM
MIC IN (−60)
MIC ATT
30
PHASE
TRIM MIC
LINE IN (−10)
TRIM TAPE
MIC
LINE
TAPE
INPUT
TAPE IN (−10)
TO BUSS/TAPE SELECT SWITCH
EQUALIZER
PARAMETRIC EQ
2.5k ∿ 15k
100 ∿ 5k
50 ∿ 500
ON
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
AUX 1/2
GAIN 1
PRE
POST
TAPE
MUTE
GAIN 2
AUX 3/4
GAIN 3
GAIN 4
SOLO
PFL

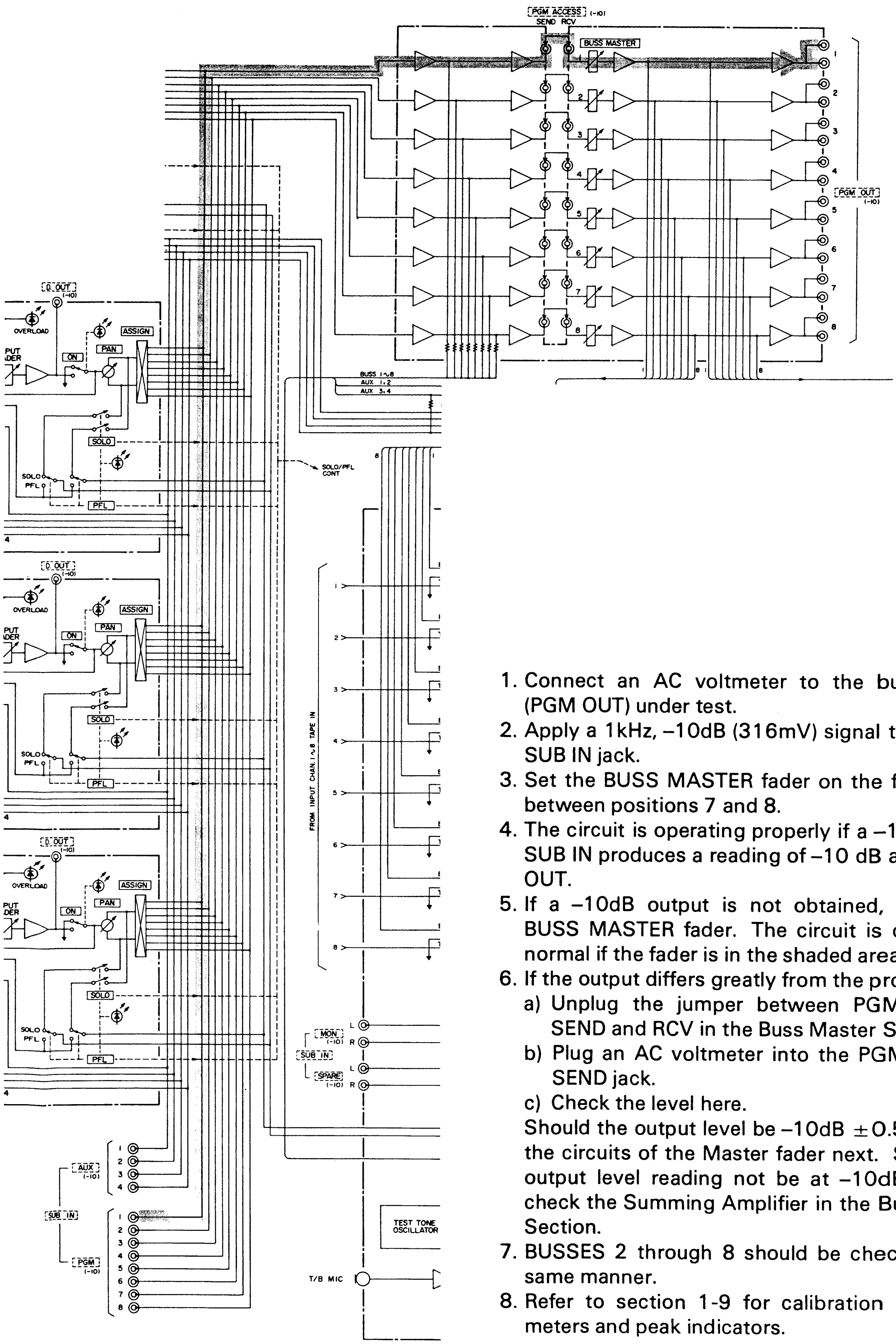
1-7. TAPE IN [2 TR A&B (L/R)] → D(irect) OUT

Carry out the following tests with the same settings specified in section 1-1 procedure # 3, except reinsert the shorting plug in the ACCESS SEND and RCV jacks, set the EQ ON switch to "on".

1. Set the INPUT select switch as appropriate to TAPE or 2 TR A(L/R) or 2TR B(L/R).
2. Set the TAPE TRIM so that a −10 dB output is obtained at the ACCESS SEND jack.
3. Plug an AC voltmeter into the D OUT jack for the channel being tested.
4. Adjust the Input Fader for a −10dB reading on the AC voltmeter.
5. The Input Fader should then be in the shaded area.
6. If there is any malfunction, the trouble may be in IC's U5, U6 or U7. The gain of amplifier IC's U5-2, U6-1 and U6-2 are unity, when the EQ GAIN knobs are set in the center position. Refer to the level diagram.
7. Check all remaining channels in the same manner.


ACCESS (−10)
SEND
RCV
D. OUT (−10)
PHANTOM POWER (48V)
PHANTOM
MIC IN (−60)
MIC ATT
30
PHASE
TRIM MIC
LINE IN (−10)
TRIM TAPE
MIC
LINE
TAPE
INPUT
TAPE IN (−10)
TO BUSS/TAPE SELECT SWITCH
EQUALIZER
PARAMETRIC EQ
2.5k ∿ 15k
100 ∿ 5k
50 ∿ 500
ON
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
AUX 1/2
GAIN 1
PRE
POST
TAPE
MUTE
GAIN 2
AUX 3/4
GAIN 3
GAIN 4
SOLO
PFL

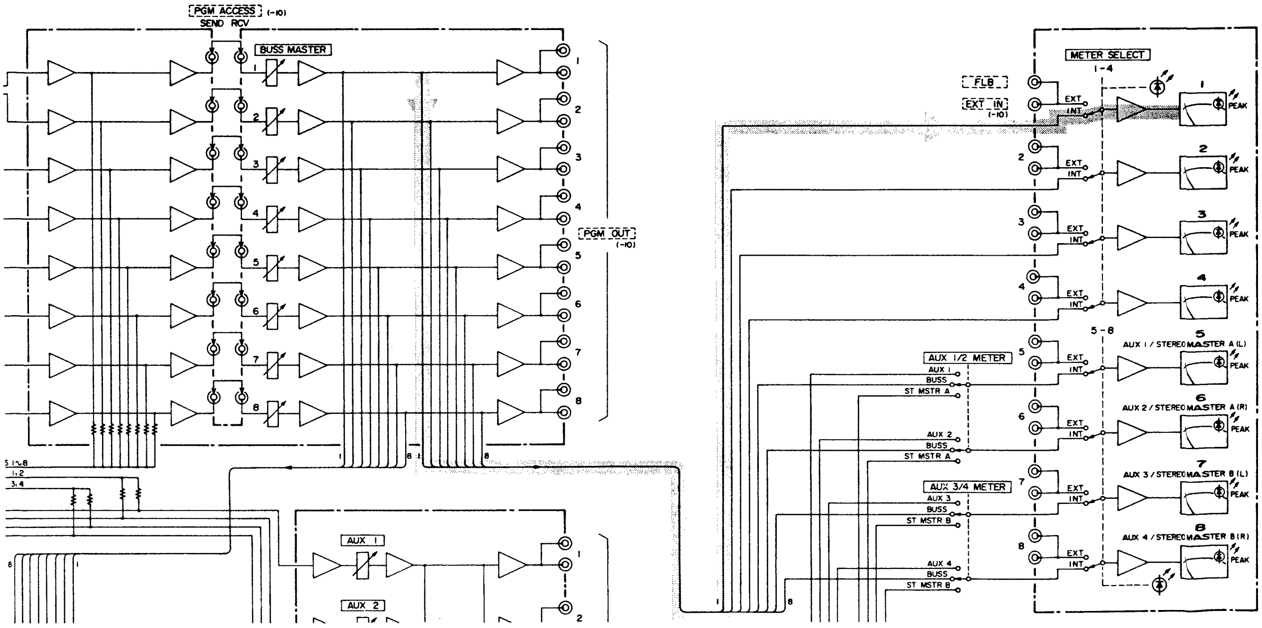
1-8. PGM SUB IN → PGM OUT (Buss Out)

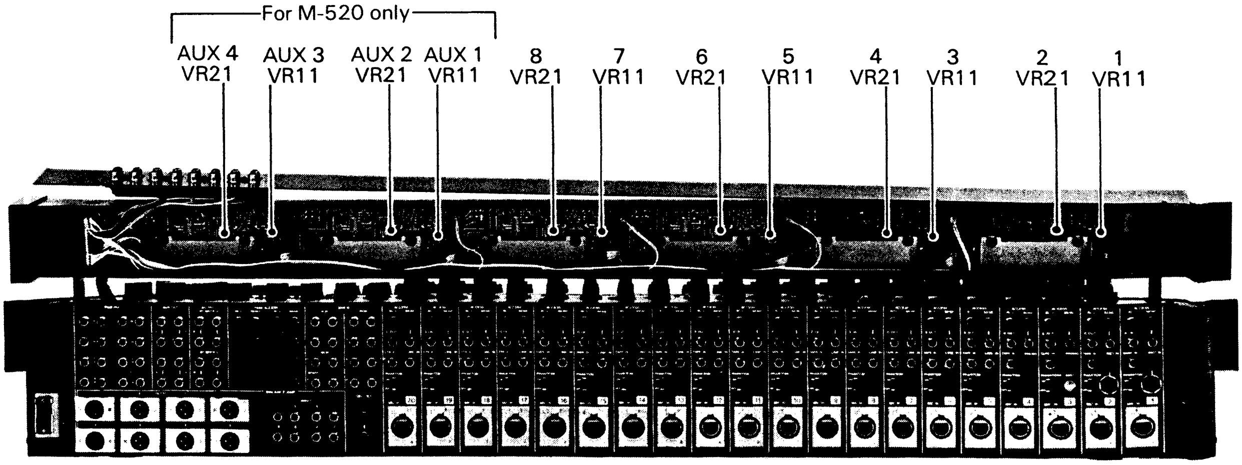

PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
1
2
3
4
5
6
7
8
D.OUT (-10)
OVERLOAD
ASSIGN
PAN
ON
SOLO
PFL
BUSS 1~8
AUX 1,2
AUX 3,4
SOLO/PFL CONT
FROM INPUT CHAN. 1~8 TAPE IN
MON (-10)
SUB IN
SPARE (-10)
AUX (-10)
PGM (-10)
TEST TONE OSCILLATOR
T/B MIC

1. Connect an AC voltmeter to the buss output (PGM OUT) under test.
2. Apply a 1kHz, –10dB (316mV) signal to the PGM SUB IN jack.
3. Set the BUSS MASTER fader on the front panel between positions 7 and 8.
4. The circuit is operating properly if a –10 dB PGM SUB IN produces a reading of –10 dB at the PGM OUT.
5. If a –10dB output is not obtained, adjust the BUSS MASTER fader. The circuit is considered normal if the fader is in the shaded area.
6. If the output differs greatly from the proper level.
   a) Unplug the jumper between PGM ACCESS SEND and RCV in the Buss Master Section.
   b) Plug an AC voltmeter into the PGM ACCESS SEND jack.
   c) Check the level here.
   Should the output level be –10dB ±0.5dB, check the circuits of the Master fader next. Should the output level reading not be at –10dB ±0.5dB, check the Summing Amplifier in the Buss Master Section.
7. BUSSES 2 through 8 should be checked in the same manner.
8. Refer to section 1-9 for calibration of the VU meters and peak indicators.

1-9. Meter Calibration and The LED Circuit

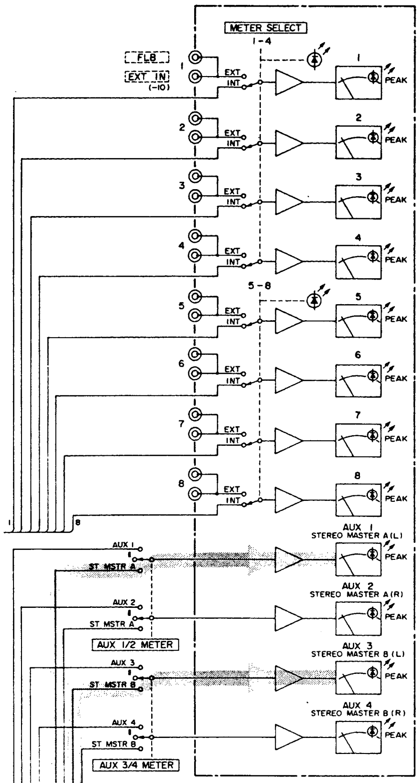
1. Use the test instrument connections described in section 1–8 for calibrating the VU meter.
2. Set the AUX 1/2 METER and the AUX 3/4 METER switches to BUSS.
3. Set the METER SELECT 1 – 4 and 5 – 8 switches to INT.
4. The calibration is correct if the VU meter indication is 0VU, ±0.5VU when the reading of an AC voltmeter connected to PGM OUT is –10dB (316mV).
5. If the VU meter does not indicate 0VU, adjust the calibrating pots, VR11 for odd channels and VR21 for even channels, on the METER AMPL PCB shown in the photo below, which corresponds to the off-spec meter.
6. Raise the PGM SUB IN input level.
7. The PEAK level LED should light up at 0dB ±1dB (0.89V to 1.12V), 10dB ±1dB above nominal PGM IN level of –10dB (316mV).
8. Test all meters from the EXT position for proper meter reading.

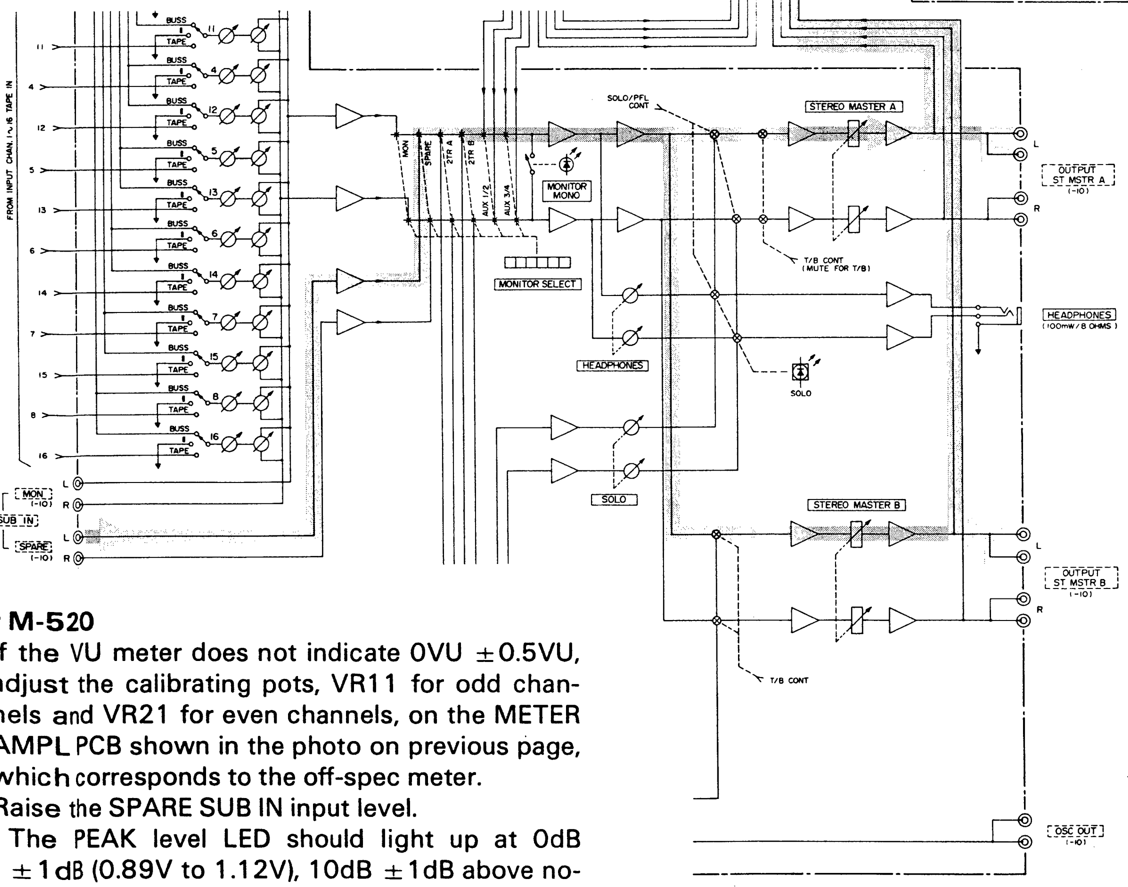

PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
AUX 1
AUX 2
METER SELECT
1-4
5-8
FLB
EXT IN (-10)
EXT
INT
PEAK
AUX 1/2 METER
AUX 3/4 METER
AUX 1
AUX 2
AUX 3
AUX 4
BUSS
ST MSTR A
ST MSTR B
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)


For M-520 only
AUX 4 VR21
AUX 3 VR11
AUX 2 VR21
AUX 1 VR11
8 VR21
7 VR11
6 VR21
5 VR11
4 VR21
3 VR11
2 VR21
1 VR11

1-10. SPARE SUB IN → ST MSTR A/B

1. Apply a 1kHz, –10dB (316mV) signal to the SPARE SUB IN (L) jack.
2. Plug AC voltmeters into the ST MSTR A(L) and the ST MSTR B (L) jacks.
3. Set the Stereo Master Section controls as follows:
   MONITOR SELECT switch: Depress SPARE to "on".
   METER SELECT switch: Set to INT (M-512)
   AUX 1/2 METER switch: Set to ST MSTR A
   AUX 3/4 METER switch: Set to ST MSTR B
4. Adjust the STEREO MASTER A and STEREO MASTER B faders for a –10dB (316mV) reading on the voltmeters.
5. The STEREO MASTER A and the STEREO MASTER B faders should then be in the shaded area between positions 7 and 8.
6. Confirm that the VU meters of the STEREO MASTER A (L) and the STEREO MASTER B (L) indicate 0VU ±1VU.
7. Check the SPARE SUB IN (R)ight channel in the same manner.


METER SELECT
1-4
5-8
FL8
EXT IN (-10)
EXT
INT
PEAK
1
2
3
4
5
6
7
8
AUX 1 STEREO MASTER A (L)
AUX 2 STEREO MASTER A (R)
AUX 3 STEREO MASTER B (L)
AUX 4 STEREO MASTER B (R)
AUX 1
ST MSTR A
AUX 2
ST MSTR A
AUX 1/2 METER
AUX 3
ST MSTR B
AUX 4
ST MSTR B
AUX 3/4 METER


FROM INPUT CHAN. 1~16 TAPE IN
BUSS
TAPE
11
4
12
5
13
6
14
7
15
8
16
MON (-10)
SUB IN
SPARE (-10)
L
R
MON
SPARE
2TR A
2TR B
AUX 1/2
AUX 3/4
SOLO/PFL CONT
MONITOR MONO
MONITOR SELECT
HEADPHONES
SOLO
STEREO MASTER A
T/B CONT (MUTE FOR T/B)
OUTPUT ST MSTR A (-10)
HEADPHONES (100mW/8 OHMS)
STEREO MASTER B
T/B CONT
OUTPUT ST MSTR B (-10)
OSC OUT (-10)

For M-520

8. If the VU meter does not indicate 0VU ±0.5VU, adjust the calibrating pots, VR11 for odd channels and VR21 for even channels, on the METER AMPL PCB shown in the photo on previous page, which corresponds to the off-spec meter.
9. Raise the SPARE SUB IN input level.
10. The PEAK level LED should light up at 0dB ±1dB (0.89V to 1.12V), 10dB ±1dB above nominal SPARE SUB IN level of –10dB (316mV).

1-11. 2TR A/B → ST MSTR A/B

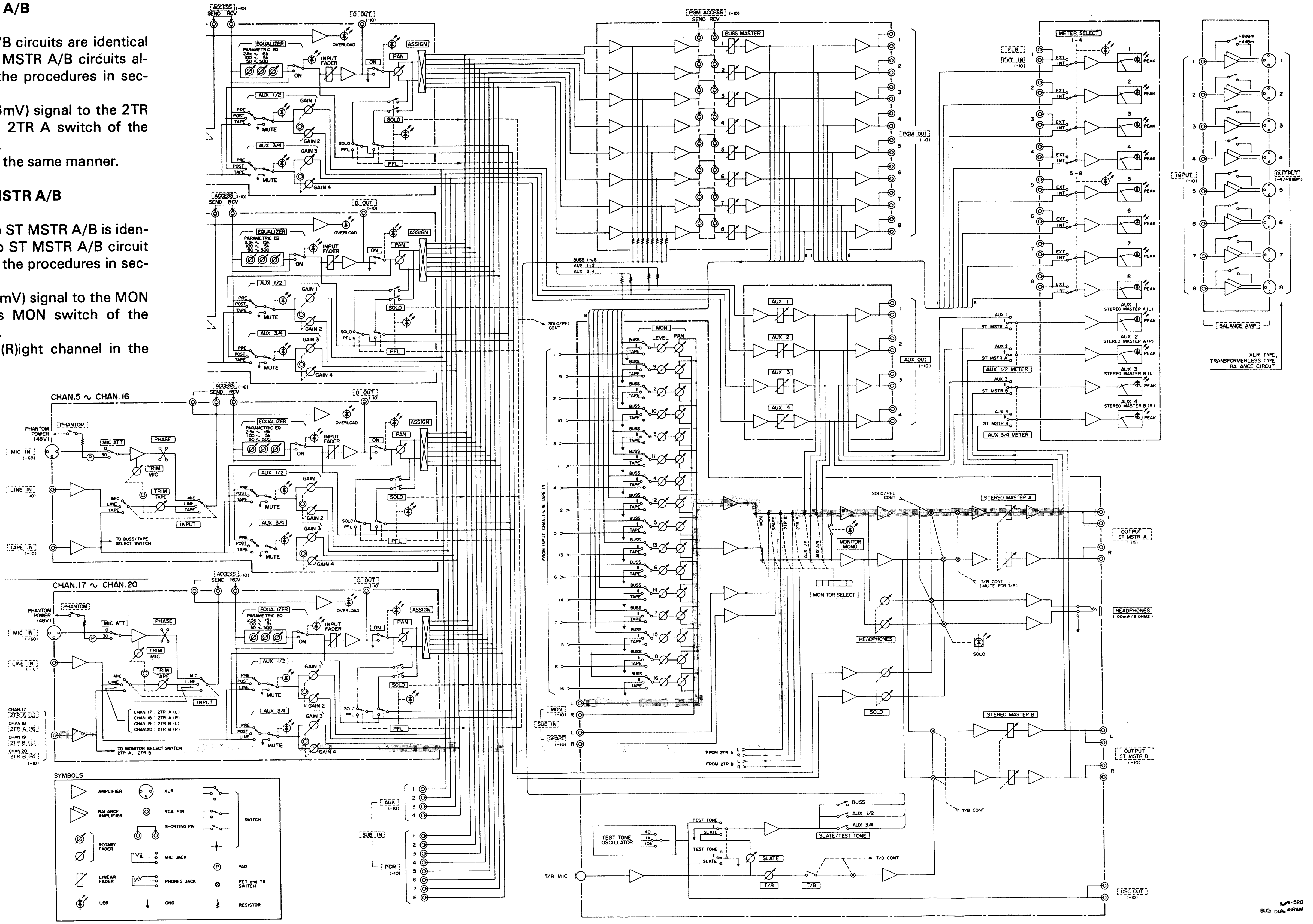
The 2TR A/B to ST MSTR A/B circuits are identical to the SPARE SUB IN to ST MSTR A/B circuits already explained. Following the procedures in section 1-10:

1. Apply a 1kHz, −10dB (316mV) signal to the 2TR A(L) jack and depress the 2TR A switch of the MONITOR SELECT to "on".
2. Check all input channels in the same manner.

1-12. MON SUB IN → ST MSTR A/B

The circuit of MON SUB IN to ST MSTR A/B is identical to the SPARE SUB IN to ST MSTR A/B circuit already explained. Following the procedures in section 1-10:

1. Apply a 1kHz, −10dB (316mV) signal to the MON SUB IN jack and depress MON switch of the MONITOR SELECT to "on".
2. Check the MON SUB IN (R)ight channel in the same manner.


CHAN.5 ∿ CHAN.16
CHAN.17 ∿ CHAN.20
ACCESS
SEND RCV
EQUALIZER
PARAMETRIC EQ
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
TAPE
MUTE
SOLO
PFL
PHANTOM POWER (48V)
PHANTOM
MIC IN
LINE IN
TAPE IN
MIC ATT
PHASE
TRIM
INPUT
TO BUSS/TAPE SELECT SWITCH
TO MONITOR SELECT SWITCH
PGM ACCESS
BUSS MASTER
PGM OUT
AUX OUT
AUX 1
AUX 2
AUX 3
AUX 4
MON
LEVEL
BUSS
SOLO/PFL CONT
FROM INPUT CHAN.1∿16 TAPE IN
METER SELECT
EXT
INT
PEAK
STEREO MASTER A
STEREO MASTER B
OUTPUT ST MSTR A
OUTPUT ST MSTR B
MONITOR MONO
MONITOR SELECT
HEADPHONES
T/B CONT
TEST TONE OSCILLATOR
SLATE/TEST TONE
SLATE
T/B
T/B MIC
OSC OUT
SUB IN
AUX
PGM
MON
SPARE
FROM 2TR A
FROM 2TR B
INPUT
OUTPUT
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
SYMBOLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
XLR
RCA PIN
SHORTING PIN
MIC JACK
PHONES JACK
GND
SWITCH
PAD
FET and TR SWITCH
RESISTOR
M-520 BLOCK DIAGRAM

ᴾGM SUB IN → ST MSTR A/B

ɪut the following check with the settings of 1-8:

the controls so that an output is obtained at ! OUT. Also set up the METER SELECT so it indicates a signal at the output.

:he Monitor Section all controls as follows:

ɪ switches : Set to BUSS
:L knobs : Set to MAX (full CW)
knobs : Set to L (full CCW) position

st the STEREO MASTER A and the STEREO ;TER B faders for a –10dB (316mV) reading the ST MSTR A (L) and the ST MSTR B (L) ;.

irm that the VU meters of the STEREO MAS- A (L) and the STEREO MASTER B (L) indicate .

the PAN knobs to the R (full CW) position, check the right channel in the same manner.

:he PAN knobs at center position. Both the ISTR A&B (L) and the ST MSTR A&B (R) out- ɜvels should be –12.5dB ± 1dB.

irm that VU meters indicate –2.5 VU within U.

k all remaining channels in the same man-

t the PAN knobs to the L (full CCW) position.

;ALANCE AMP INPUT → BALANCE AMP)UTPUT

/ a 1kHz, –10dB (316mV) signal to the BAL- ≡ AMP INPUT (1) jack.

an AC voltmeter into the BALANCE AMP ᴾUT (1) connector.

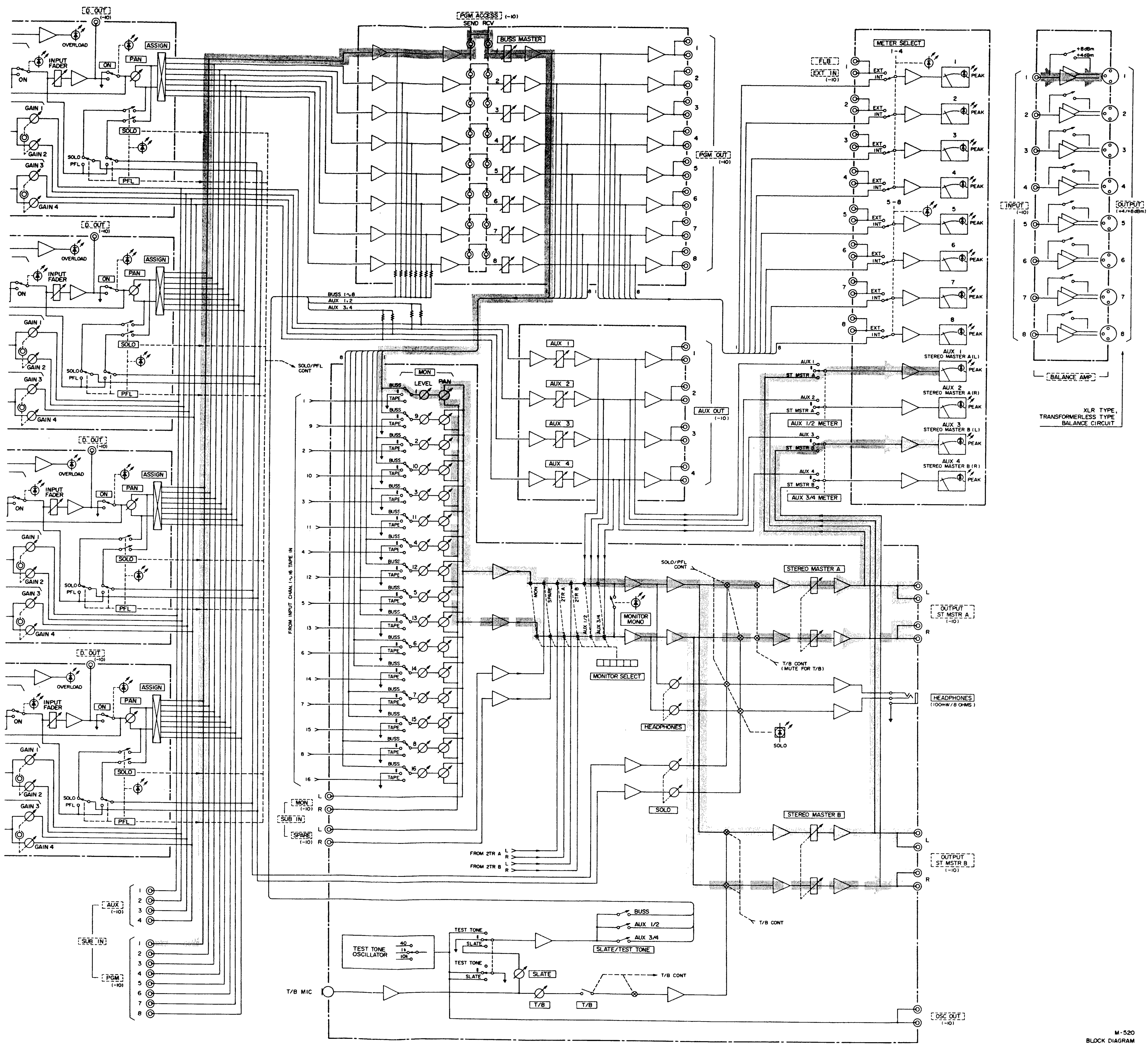
he output level on the IN/OUT AMPL. PCB. :h to +4dBm.

voltmeter should read +4dBm (1.23V) ·dB.

ɪe output level switch to +8dBm.

AC voltmeter should read +8dBm (1.95V) ·dB.

k all remaining channels in the same man-


D. OUT
OVERLOAD
INPUT FADER
ON
ASSIGN
PAN
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
PGM ACCESS (–10)
SEND RCV
BUSS MASTER
PGM OUT (–10)
BUSS 1~8
AUX 1,2
AUX 3,4
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (–10)
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN. 1~16 TAPE IN
SOLO/PFL CONT
MON (–10)
SUB IN
SPARE (–10)
AUX (–10)
SUB IN
PGM (–10)
METER SELECT
1-4
5-8
FLB
EXT IN (–10)
EXT
INT
PEAK
AUX 1 STEREO MASTER A (L)
AUX 2 STEREO MASTER A (R)
AUX 3 STEREO MASTER B (L)
AUX 4 STEREO MASTER B (R)
ST MSTR A
ST MSTR B
AUX 1/2 METER
AUX 3/4 METER
INPUT (–10)
OUTPUT (+4/+8dBm)
+8dBm
+4dBm
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
STEREO MASTER A
STEREO MASTER B
MONITOR MONO
MONITOR SELECT
T/B CONT (MUTE FOR T/B)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
SOLO
OUTPUT ST MSTR A (–10)
OUTPUT ST MSTR B (–10)
FROM 2TR A
FROM 2TR B
T/B CONT
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
BUSS
AUX 1/2
AUX 3/4
SLATE/TEST TONE
T/B
T/B MIC
OSC OUT (–10)
M-520
BLOCK DIAGRAM

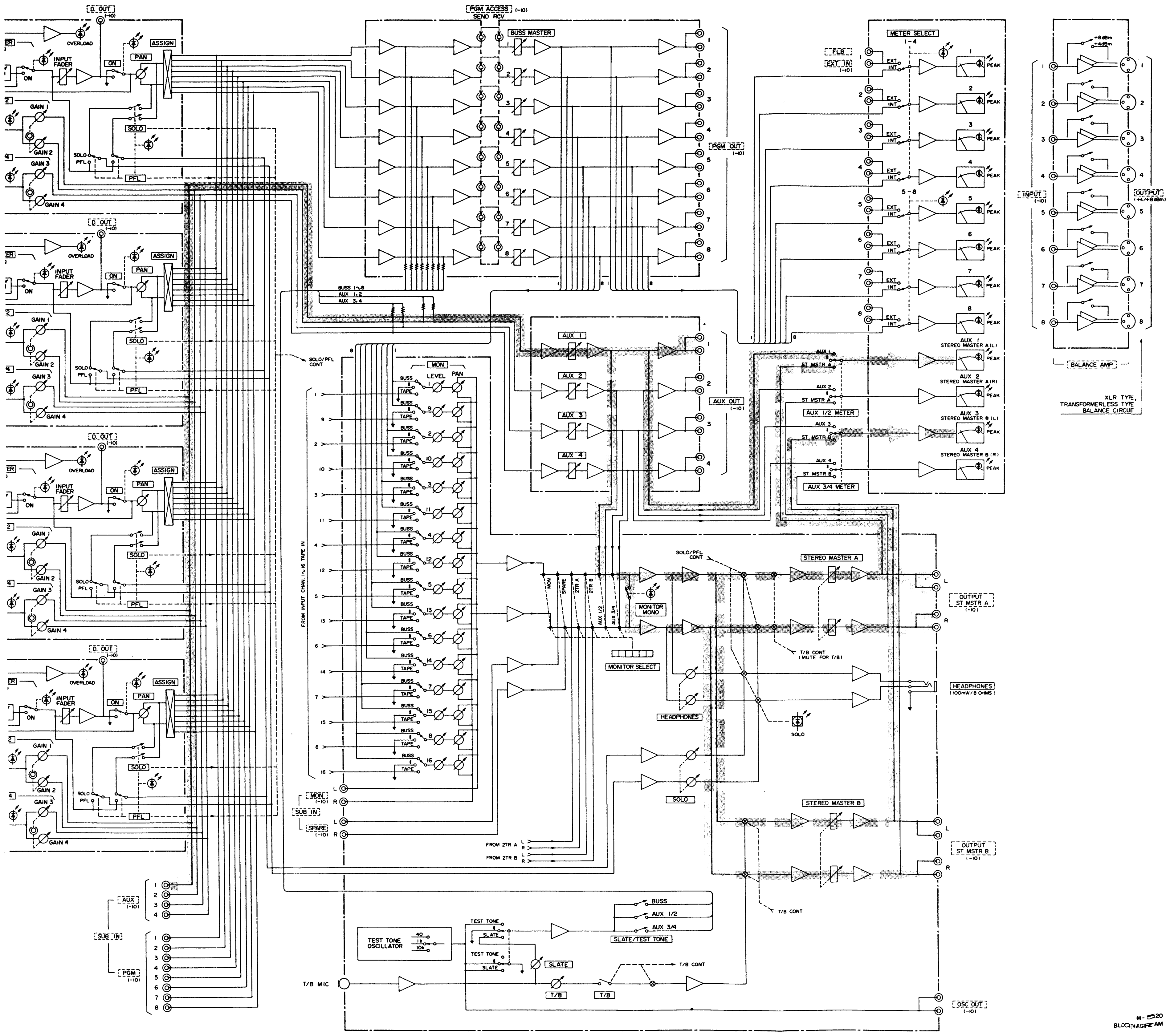
1-15. AUX SUB IN → AUX OUT

1. Plug an AC voltmeter into the AUX OUT (1) jack.
2. Apply a 1kHz, –10dB (316mV) signal to the AUX SUB IN (1) jack.
3. Set the AUX 1/2 METER switch to AUX 1.
4. Adjust the AUX 1 fader for a –10dB (316mV) reading on the voltmeter.
5. Confirm that the VU meter of the AUX 1 indicates 0VU.
6. Check all remaining channels in the same manner.

1-16. AUX SUB IN → ST MSTR A/B

Carry out the following check with the settings of section 1-15.

1. Set the controls so that a –10dB output is obtained at AUX OUT.
2. Depress AUX 1/2 switch of the MONITOR SELECT to "on".
3. Adjust the STEREO MASTER A and STEREO MASTER B faders for a –10dB (316mV) reading from the ST MSTR A (L) and ST MSTR B (L) jacks.
4. The STEREO MASTER A and the STEREO MASTER B faders should then be in the shaded area between positions 7 and 8.
5. Set the AUX 1/2 METER and AUX 3/4 METER switchs to ST MSTR A or ST MSTR B.
6. Confirm that the VU meters of the STEREO MASTER A (L) and the STEREO MASTER B (L) indicate 0VU.
7. Check the all remaining channels in the same manner.
8. Depress the MONITOR MONO to "on". When the signal is input to any channel of the AUX SUB IN jack, the AC voltmeter should read –14.5dB ±1dB from both left and right channels of the ST MSTR A and ST MSTR B outputs.



D. OUT (-10)
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
PGM OUT (-10)
METER SELECT 1-4
FLIP
EXT IN (-10)
EXT
INT
PEAK
INPUT (-10)
OUTPUT (+4/+8dBm)
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
BUSS 1~8
AUX 1,2
AUX 3,4
SOLO/PFL CONT
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN 1~16 TAPE IN
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
AUX 1 STEREO MASTER A (L)
AUX 2 STEREO MASTER A (R)
AUX 3 STEREO MASTER B (L)
AUX 4 STEREO MASTER B (R)
ST MSTR A
ST MSTR B
AUX 1/2 METER
AUX 3/4 METER
STEREO MASTER A
OUTPUT ST MSTR A (-10)
MONITOR MONO
MONITOR SELECT
T/B CONT (MUTE FOR T/B)
HEADPHONES
HEADPHONES (100mW / 8 OHMS)
SOLO
STEREO MASTER B
OUTPUT ST MSTR B (-10)
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
BUSS
AUX 1/2
AUX 3/4
SLATE/TEST TONE
T/B
T/B CONT
T/B MIC
OSC OUT (-10)
M-520 BLOCK DIAGRAM

PE IN [2 TR A&B (L/R)] → PGM OUT
the following check with the settings of 7.
e controls so that a –10dB output is ob- at D OUT.
ntrols of the selected channel being test- the Input Section panel as follows:

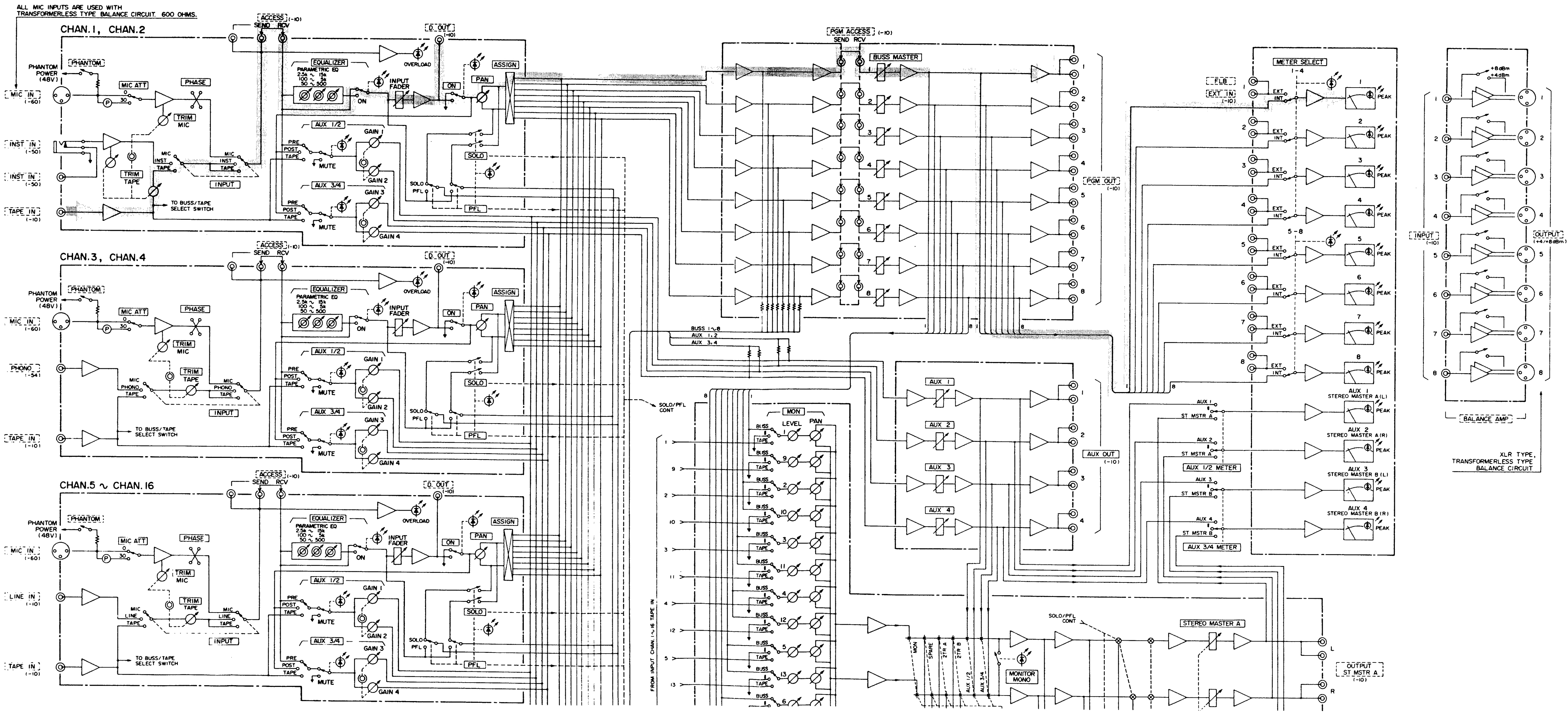
ute) : Set to OFF
N : Depress 1 to ON
: Set to position ODD (full CCW rotation)
MASTER : Set between positions 7 and 8
/2, 3/4
R : Set to BUSS
R SELECT : Set to INT

rcuit is normal if a –10dB PGM OUT read- obtained with a –10dB TAPE IN [2 TR ./R)] level.

4. If a –10dB output is not obtained, adjust the BUSS MASTER fader. The circuit is normal if the fader is in the shaded area.
5. Confirm that the VU meter indicates 0VU.
6. If the output differs greatly from the proper level.
   a) Unplug the jumper between PGM ACCESS SEND and RCV in the Buss Master Section.
   b) Plug an AC voltmeter into the PGM ACCESS SEND jack.
   c) Check the level here.

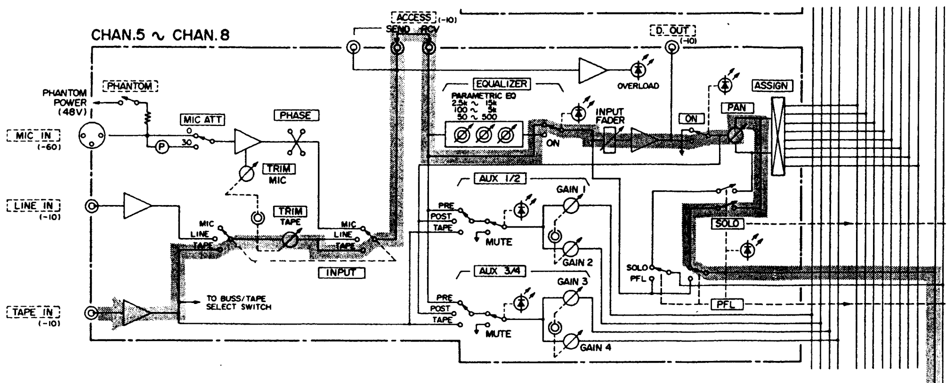
   Should the output level be –10dB, check the circuits of the BUSS MASTER fader next. Should the output level reading not be at –10dB, check the circuits of the ASSIGN switch of the Input Section and the Summing Amplifier in the Buss master Section.
7. Frequency response and T.H.D. of TAPE IN [2 TR A&B (L/R] → PGM OUT

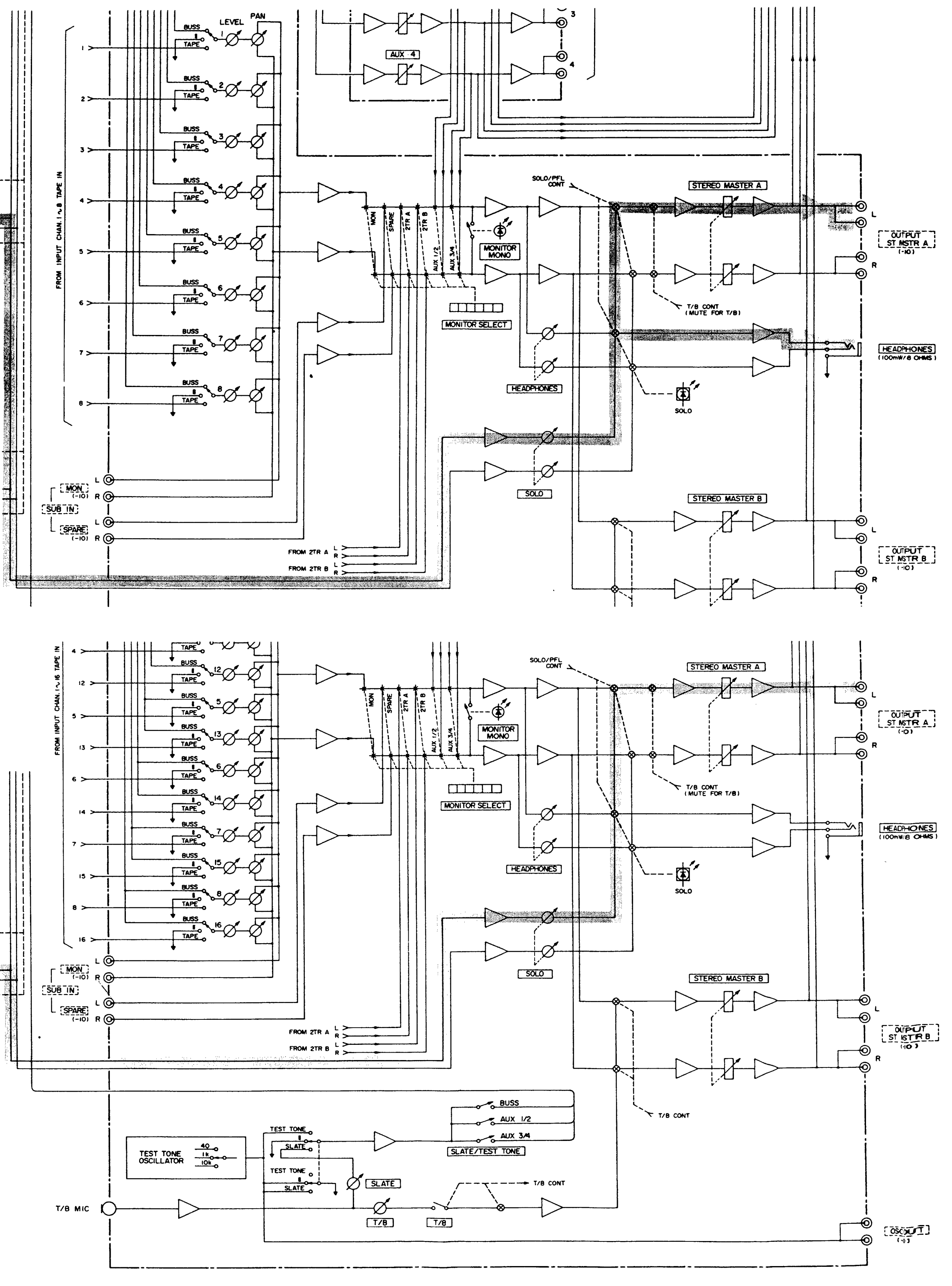
   Frequency response : 20Hz ~ 20 kHz, within ± 1dB
   T.H.D. : Less than 0.025% (at 1kHz, EQ OUT, measured with 30kHz L.P.F.)
8. S/N - 1: 1 Channel to 1 Buss
   When only one channel is ASSIGNED to Buss Master group 1, the S/N ratio should be:
   Better than 87dB using an "A" weighted network.
   Better than 86dB when measured with a bandpass filter, 20Hz to 20kHz.
9. S/N - 2: All Channels to 1 Buss
   When all of the all channels are ASSIGNED to Buss Master 1, the S/N ratio should be:
   Better than 80dB (M-512) or 74dB (M-520) using an "A" weighted network.
   Better than 77dB (M-512) or 72dB (M-520) when measured with a bandpass filter, 20Hz to 20kHz.
10. The remaining Buss Master groups 2 ~ 8 should also be checked in the same manner.
    When an even-numbered ASSIGN switch is depressed, set the PAN knob to position EVEN (full CW).
11. Set the PAN knob to the center position.
    The PGM OUT level for each selected ASSIGN switch should be –12.5dB ± 1dB.



ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.16
PHANTOM
PHANTOM POWER (48V)
MIC ATT
PHASE
TRIM
MIC IN (-60)
INST IN (-50)
PHONO (-54)
LINE IN (-10)
TAPE IN (-10)
TO BUSS/TAPE SELECT SWITCH
INPUT
ACCESS (-10) SEND RCV
D.OUT (-10)
OVERLOAD
EQUALIZER
PARAMETRIC EQ
INPUT FADER
ON
ASSIGN
PAN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
TAPE
MUTE
SOLO
PFL
PGM ACCESS (-10) SEND RCV
BUSS MASTER
PGM OUT (-10)
BUSS 1~8
AUX 1, 2
AUX 3, 4
SOLO/PFL CONT
FROM INPUT CHAN. 1~16 TAPE IN
MON
LEVEL
BUSS
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
STEREO MASTER A
MONITOR MONO
OUTPUT ST MSTR A (-10)
METER SELECT 1-4
FLB
EXT IN (-10)
EXT
INT
PEAK
ST MSTR A
ST MSTR B
AUX 1/2 METER
AUX 3/4 METER
STEREO MASTER A (L)
STEREO MASTER A (R)
STEREO MASTER B (L)
STEREO MASTER B (R)
INPUT (-10)
OUTPUT (+4/+8dBm)
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT

1-18. SOLO Circuit and HEADPHONES Circuit

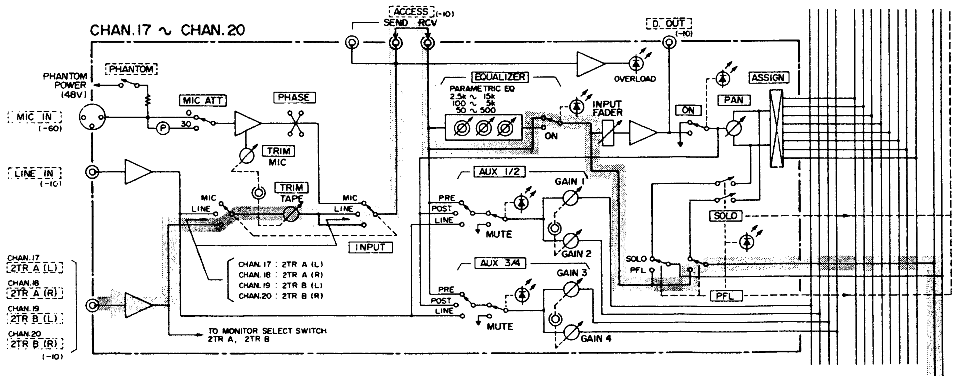

CHAN.5 ~ CHAN.8
ACCESS
SEND RCV
D. OUT
PHANTOM
PHANTOM POWER (48V)
MIC IN (-60)
LINE IN (-10)
TAPE IN (-10)
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
INPUT
EQUALIZER
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
MUTE
SOLO
PFL
TO BUSS/TAPE SELECT SWITCH


BUSS
TAPE
LEVEL
PAN
AUX 4
FROM INPUT CHAN.1~8 TAPE IN
SOLO/PFL CONT
STEREO MASTER A
OUTPUT ST MSTR A (-10)
MONITOR MONO
MONITOR SELECT
T/B CONT (MUTE FOR T/B)
HEADPHONES
HEADPHONES (100mW/8 OHMS)
SOLO
STEREO MASTER B
OUTPUT ST MSTR B (-10)
MON (-10)
SUB IN
SPARE (-10)
FROM 2TR A
FROM 2TR B
L
R
T/B CONT
TEST TONE OSCILLATOR
TEST TONE
SLATE
SLATE/TEST TONE
AUX 1/2
AUX 3/4
T/B MIC
T/B
OSC OUT

1. Apply a 1kHz, –10dB (316mV) signal to the TAPE IN or the 2 TR A&B (L/R) jack, set the input fader for a –10dB (316mV) signal at the D(irect) OUT jack, depress the SOLO button, and set the PAN knob to the CCW position.
2. Adjust the SOLO control for a –10dB (316mV) reading from the ST MSTR A jack when the STEREO MASTER A fader is set to nominal position.
3. Verify that the input fader varies the output level.
4. The LEDs located above the SOLO knob and the monitor section will light whenever the SOLO button on the input section is depressed.
5. Check all remaining input channels in the same manner.
6. Connect an 8 ohm load resistor to the HEADPHONES jack and set the HEADPHONES knob to max.
7. Adjust the input signal and measure the HEADPHONES output level just before the waveform begins to clip. This should be performed by connecting an oscilloscope across the 8 ohm load resistor.
   Max. output level: More than 0.9V (100mW)

IMPORTANT: BE SURE TO OBSERVE THE PROPER POLARITY OF THE SCOPE TEST PROBE AND THE OUTPUT OF THE HEADPHONES JACK, FAILURE TO PROPERLY CONNECT MAY CAUSE DAMAGE TO THE HEADPHONE AMPLIFIER.

1-19. PFL Circuit


CHAN.17 ~ CHAN.20
ACCESS
SEND RCV
D. OUT
PHANTOM
PHANTOM POWER (48V)
MIC IN (-60)
LINE IN (-10)
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
INPUT
EQUALIZER
OVERLOAD
INPUT FADER
ASSIGN
PAN
ON
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
MUTE
SOLO
PFL
CHAN.17 2TR A (L)
CHAN.18 2TR A (R)
CHAN.19 2TR B (L)
CHAN.20 2TR B (R)
CHAN.17 : 2TR A (L)
CHAN.18 : 2TR A (R)
CHAN.19 : 2TR B (L)
CHAN.20 : 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B

1. Apply a 1kHz, –10dB (316mV) signal to the TAPE IN or the 2TR A&B (L/R) jack, set the TAPE TRIM for a –10dB (316mV) reading at the ACCESS SEND jack, and depress the PFL button. (Reset the SOLO button to "off".)
2. Adjust the SOLO control for a –10dB (316mV) reading from the ST MSTR A jack when the STEREO MASTER A fader is set to nominal position.
3. Varying the input fader should not cause the output level to vary.
4. The LEDs located above the SOLO knob and the monitor section will light whenever the PFL button on the input section is depressed.
5. Check all remaining input channels in the same manner.

TAPE IN [2 TR A&B (L/R)] → AUX OUT

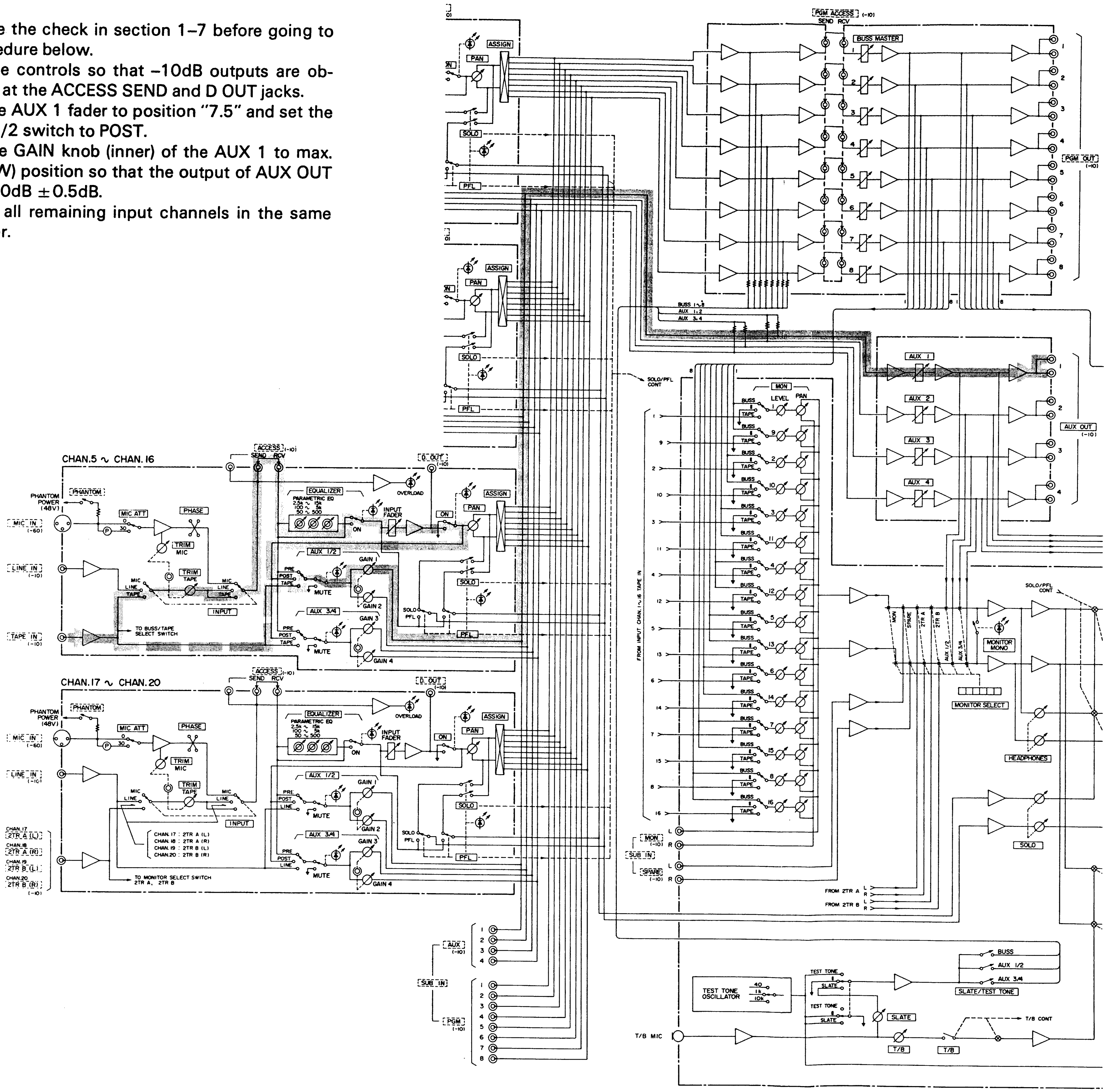
ete the check in section 1–7 before going to ɔcedure below.

the controls so that –10dB outputs are obed at the ACCESS SEND and D OUT jacks.

the AUX 1 fader to position "7.5" and set the ‹ 1/2 switch to POST.

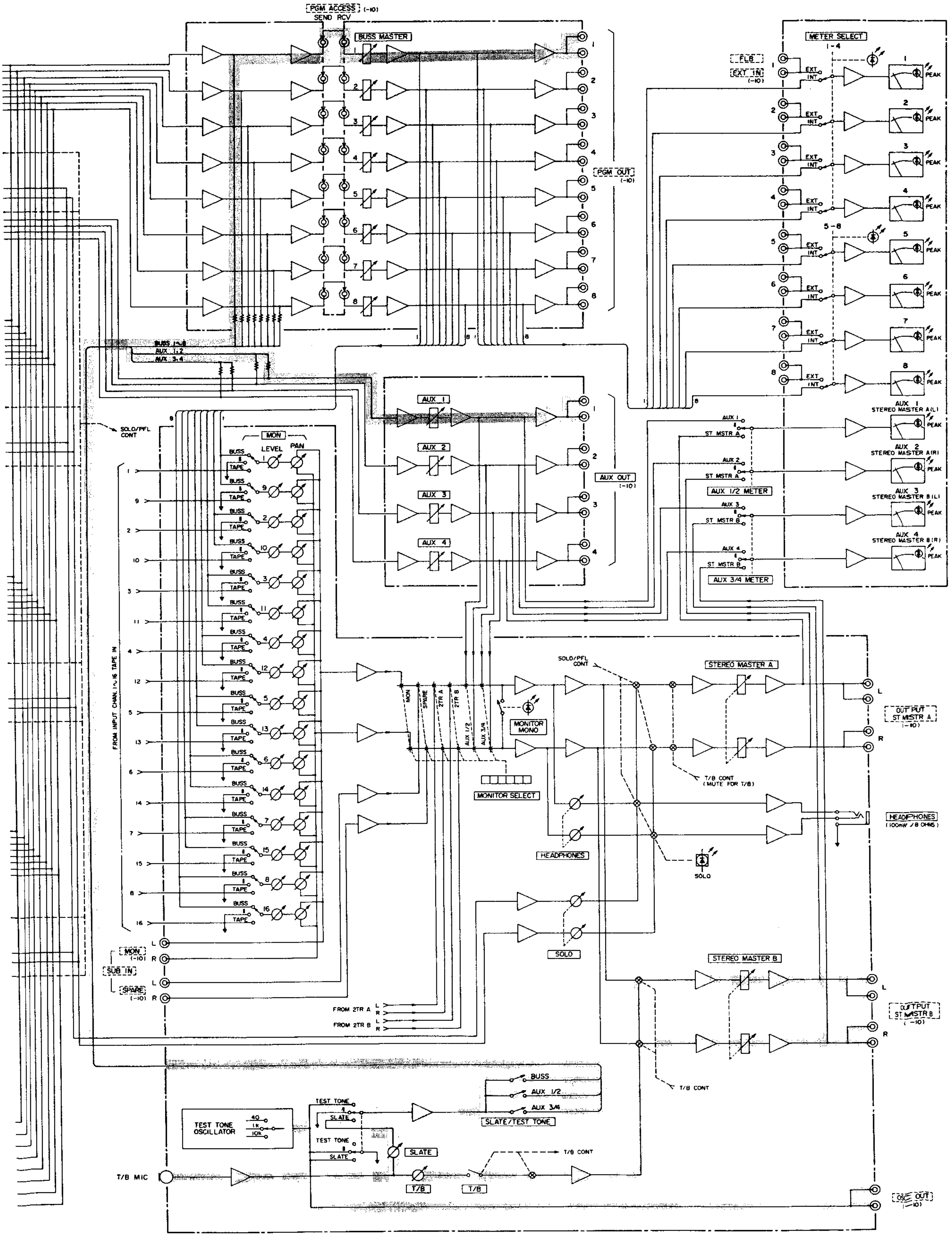
the GAIN knob (inner) of the AUX 1 to max. CW) position so that the output of AUX OUT –10dB ±0.5dB.

ck all remaining input channels in the same ıner.


CHAN.5 ∿ CHAN.16
CHAN.17 ∿ CHAN.20
PHANTOM POWER (48V)
MIC IN (-60)
LINE IN (-10)
TAPE IN (-10)
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
INPUT
ACCESS SEND RCV (-10)
D.OUT (-10)
EQUALIZER PARAMETRIC EQ
OVERLOAD
INPUT FADER
ON
ASSIGN
PAN
AUX 1/2
AUX 3/4
GAIN 1
GAIN 2
GAIN 3
GAIN 4
PRE
POST
TAPE
LINE
MUTE
SOLO
PFL
TO BUSS/TAPE SELECT SWITCH
CHAN.17 : 2TR A (L)
CHAN.18 : 2TR A (R)
CHAN.19 : 2TR B (L)
CHAN.20 : 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
PGM ACCESS SEND RCV (-10)
BUSS MASTER
PGM OUT (-10)
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
BUSS 1∿8
AUX 1/2
AUX 3/4
SOLO/PFL CONT
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN.1∿16 TAPE IN
MON
SUB IN
SPARE
FROM 2TR A
FROM 2TR B
MONITOR MONO
MONITOR SELECT
HEADPHONES
SOLO
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
TEST TONE
SLATE
SLATE/TEST TONE
T/B
T/B MIC
T/B CONT

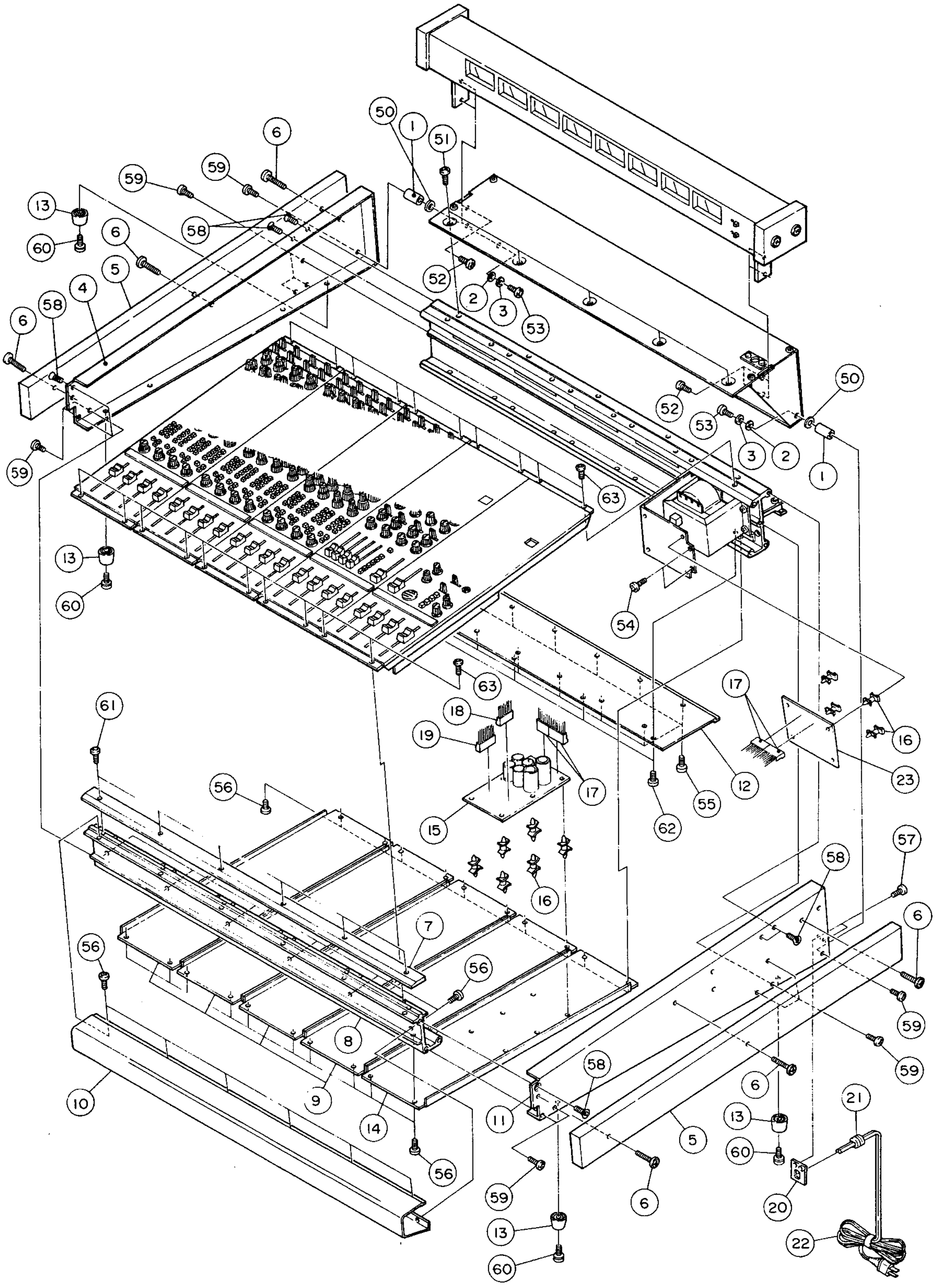
1-21. TALKBACK Circuit

1. Set the SLATE/I/TEST TONE switch to TEST TONE.
A –10dB±1dB signal (40/1k/10k Hz) should appear at the OSC OUT jack.
Depress the SLATE /I/TEST TONE (BUSS, AUX 1/2 and AUX 3/4) switches.
The signal goes through the SLATE/I/TEST TONE (BUSS, AUX 1/2 and AUX 3/4) switches and appears at the PGM OUT and AUX OUT jacks.
2. Set the SLATE/I/TEST TONE switch to SLATE and depress the T/B switch to "on". The output from the MICrophone installed in the talkback circuit is then applied to the SLATE and the T/B pots.
3. The signal is applied to the SLATE /I/TEST TONE (BUSS, AUX 1/2 and AUX 3/4) switches and the T/B switch, and signal from the T/B switch is applied to the STEREO MASTER B circuit.


PGM ACCESS (-10)
SEND RCV
BUSS MASTER
1
2
3
4
5
6
7
8
PGM OUT (-10)
METER SELECT
1-4
5-8
FLB
EXT IN (-10)
EXT
INT
PEAK
AUX 1 STEREO MASTER A(L)
AUX 2 STEREO MASTER A(R)
AUX 3 STEREO MASTER B(L)
AUX 4 STEREO MASTER B(R)
AUX 1
AUX 2
AUX 3
AUX 4
ST MSTR A
ST MSTR B
AUX 1/2 METER
AUX 3/4 METER
BUSS 1-8
AUX 1,2
AUX 3,4
AUX OUT (-10)
SOLO/PFL CONT
MON
LEVEL
PAN
BUSS
TAPE
FROM INPUT CHAN 1-16 TAPE IN
MON (-10)
SUB IN
SPARE (-10)
L
R
FROM 2TR A
FROM 2TR B
MON
SPARE
2TR A
2TR B
AUX 1/2
AUX 3/4
MONITOR MONO
MONITOR SELECT
STEREO MASTER A
OUTPUT ST MSTR A (-10)
T/B CONT (MUTE FOR T/B)
HEADPHONES (100mW / 8 OHMS)
HEADPHONES
SOLO
STEREO MASTER B
OUTPUT ST MSTR B (-10)
T/B CONT
BUSS
AUX 1/2
AUX 3/4
SLATE/TEST TONE
TEST TONE
SLATE
TEST TONE OSCILLATOR
40
1k
10k
SLATE
T/B CONT
T/B MIC
T/B
T/B
OSC OUT (-10)

2. EXPLODED VIEW AND PARTS LIST

2-1. Exploded View-1 (Main Frame) [M-512]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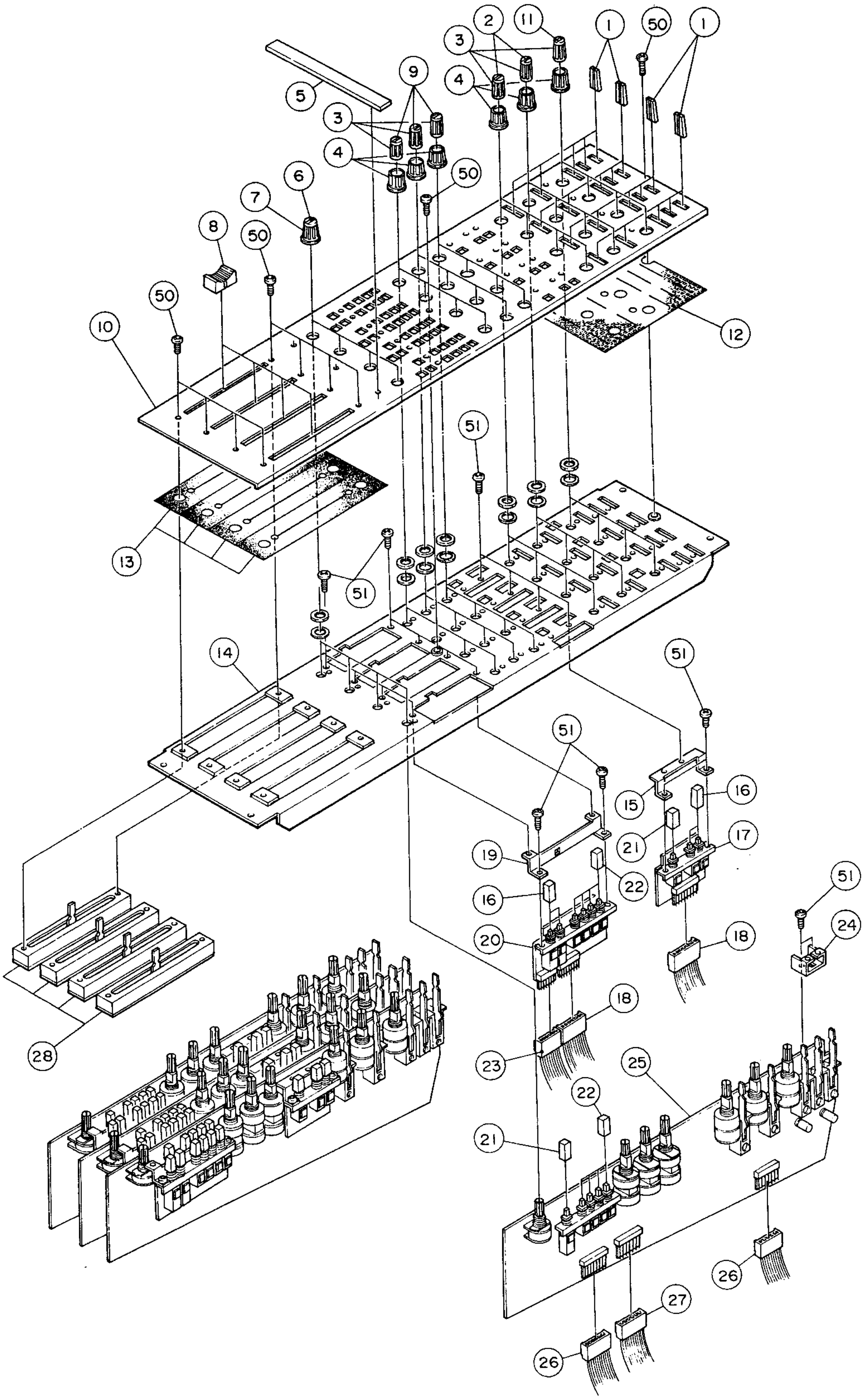
Exploded View – 1 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
1- 1	*5800370700	Collar, Rear; A	M-50	
1- 2	*5022121000	Spring, Hold Bearing		
1- 3	*5800395100	Collar, Rear; B	M-50	
1- 4	*5800539400	Chassis, Side; L		
1- 5	*5800535500	Board, Side B		
1- 6	*5504549000	Screw, M4 x 25		
1- 7	*5800536100	Plate, Number; C		
1- 8	*5800538500	Sash, Flont; C		
1- 9	*5800537900	Chassis, Rear; A		
1-10	*5800536900	Pad Assy, C		
1-11	*5800539300	Chassis, Side; R		
1-12	*5800538200	Chassis, Rear; D		
1-13	*5534596000	Foot		
1-14	*5800538000	Chassis, Rear; B		
1-15	*5200110001	PCB Assy, POWER SUPPLY		
1-16	*5787000300	Support, Locking		
1-17	*5336094500	Connector Socket, 5P		
1-18	*5336094600	Connector Socket, 6P		
1-19	*5336094700	Connector Socket, 7P		
1-20	*5800137100	Bracket, Cord Bush	MM-20	
1-21	⚠ *5534660000	Bush, AC Cord [J, GE, E, A, U]		
	⚠ *5317001700	Bush, AC Cord [UK]		
	⚠ *5317001800	Bush, AC Cord [C]		
1-22	⚠ *5128027000	Cord, AC Power [J]		
	⚠ *5350008100	Cord, AC Power [C]		
	⚠ *5350008200	Cord, AC Power [E]		
	⚠ *5128047000	Cord, AC Power [UK]		
	⚠ *5350008300	Cord, AC Power [A]		
	⚠ *5350010800	Cord, AC Power [GE, U]		
1-23	*5200135300	PCB Assy, FUSE [J, U, C, GE]		
1-50	*5785308000	Washer, ϕ8 x ϕ12 x t0.25		
1-51	*5780424006	Screw, Tras (BLK Ni) M4 x 6		
1-52	*5783084008	Screw, C Tite A M4 x 8		
1-53	*5780424012	Screw, Bind Sems A M4 x 12		
1-54	*5780033008	Screw, Bind Sems A M3 x 8		
1-55	*5780003006	Screw, Bind M3 x 6		
1-56	*5781023008	Screw, Tapping M3 x 8		
1-57	*5780023006	Screw, Bind (BLK Ni) M3 x 6		
1-58	*5780204012	Screw, F. Countersunk M4 x 12		
1-59	*5780424012	Screw, Bind Tras (BLK Ni) M4 x 12		
1-60	*5780054014	Screw, Bind Sems F M4 x 14		
1-61	*5780023006	Screw, Bind (BLK Ni) M3 x 6		
1-62	*5780123008	Screw, Tapping M3 x 8		

[U]:	U.S.A.
[C]:	CANADA
[GE]:	GENERAL EXPORT
[A]:	AUSTRALIA
[E]:	EUROPE
[UK]:	U.K.
[L]:	LIMITED AREA
[J]:	JAPAN

Parts marked with * require longer delivery time.

2-2. Exploded View-2 (Input Ampl.) [M-512]



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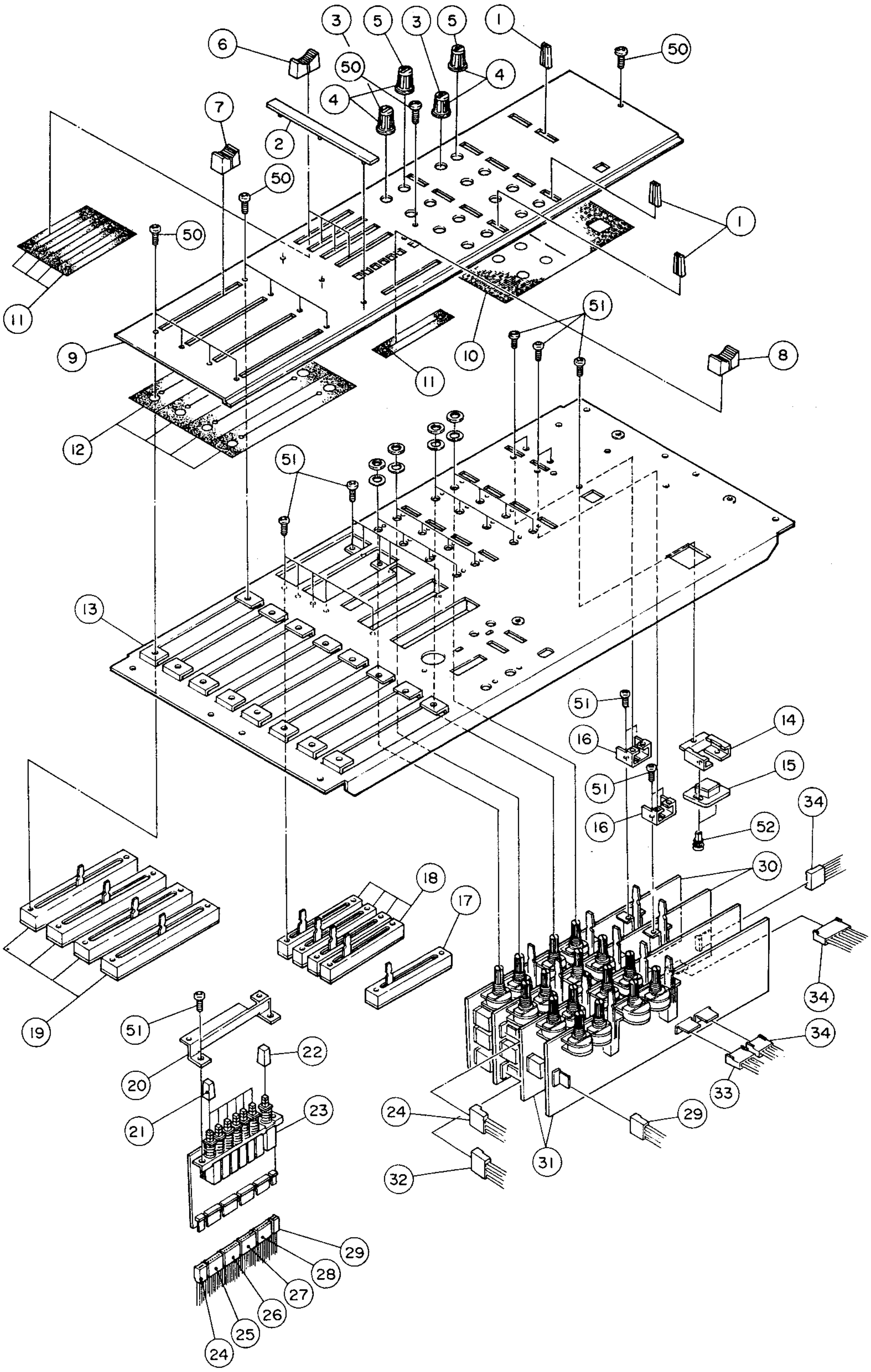
Exploded View – 2 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
2- 1	5800403300	Knob, Lever Switch	M-50	
2- 2	5800134200	Cap, Knob (Green)	M-50	
2- 3	5800382800	Knob, B-11D		
2- 4	5800383001	Knob, B-15W		
2- 5	*5800380900	Plate, Memo	M-50	
2- 6	6006054100	Cap, Knob (Ivory)	M-5	
2- 7	5800382900	Knob, B-15D		
2- 8	5800542800	Knob, Fader; A (Yellow)		
2- 9	5800133900	Cap, Knob (Orange)	M-50	
2-10	*5800559200	Panel, Input; B3 (Chan. 1 ~ 4)		
	*5800559100	Panel, Input; B2 (Chan. 5 ~ 8)		
	*5800559000	Panel, Input; B1 (Chan. 9 ~ 12)		
2-11	5800134000	Cap, Knob (Red)	M-50	
2-12	*5800385200	Mask, Lever, Switch; C	M-50	
2-13	*5800317400	Mask, Slide Vol. (100 mm)		
2-14	*5800537800	Chassis Assy, Input; B		
2-15	*5800370302	Plate, Push Switch; 4P	M-50	
2-16	5800541100	Knob, J, B (Gray)		
2-17	*5210086301	PCB, SW (A)		
2-18	*5122174000	Connector Socket, 12P (WHT)		
2-19	*5800370400	Plate, Push Switch; 7P	M-50	
2-20	*5210086401	PCB, SW (B)		
2-21	5800541000	Knob J, A (Ivory)		
2-22	5800541600	Knob, Assign		
2-23	*5122168000	Connector Socket, 6P (WHT)		
2-24	*5800370100	Plate, Lever Switch	M-50	
2-25	*5200133000	PCB Assy, INPUT AMPL.; A (Chan. 1, 2)		
	*5200133010	PCB Assy, INPUT AMPL.; B (Chan. 3)		
	*5200133020	PCB Assy, INPUT AMPL.; C (Chan. 4)		
	*5200133030	PCB Assy, INPUT AMPL.; D (Chan. 5 ~ 7)		
	*5200133040	PCB Assy, INPUT AMPL.; E (Chan. 8)		
	*5200133050	PCB Assy, INPUT AMPL.; F (Chan. 9 ~ 11)		
	*5200133060	PCB Assy, INPUT AMPL.; G (Chan. 12)		
2-26	*5122170000	Connector Socket; 8P (WHT)		
2-27	*5122169000	Connector Socket; 7P (WHT)		
2-28	5284007400	Variable Resistor, Slide; 10kΩ(A)		5284008700
2-50	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
2-51	*5780033006	Screw, Bind Sems A M3 x 6		

Parts marked with * require longer delivery time.

2-3. Exploded View-3 (Monitor Ampl.) [M-512]



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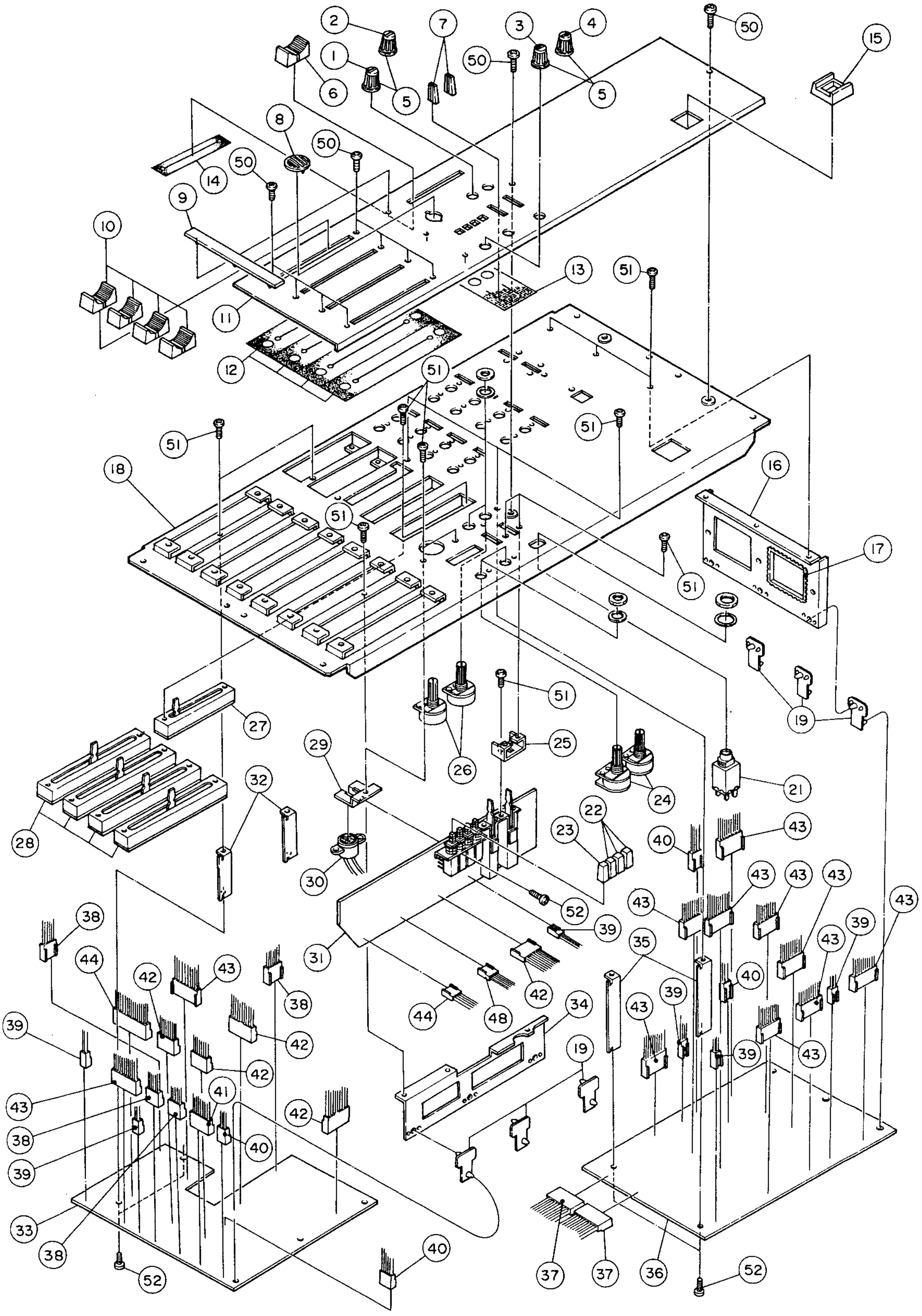
Exploded View – 3 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
3- 1	5800403300	Knob, Lever Switch	M-50	
3- 2	*5800380900	Plate, Memo	M-50	
3- 3	6006054100	Cap, Knob (Ivory)	M-5	
3- 4	5800382900	Knob, B-15D		
3- 5	6006055100	Cap, Knob (Yellow)	M-5	
3- 6	5800542200	Knob, Fader; A (Yellow)		
3- 7	5800542900	Knob, Fader; B (White)		
3- 8	5800543000	Knob, Fader; C (Red)		
3- 9	*5800559300	Panel, Monitor; B		
3-10	*5800385300	Mask, Lever Switch; D	M-50	
3-11	*5800266400	Mask, Slide Vol. (60 mm)		
3-12	*5800317400	Mask, Slide Vol. (100 mm)		
3-13	*5800537700	Chassis Assy, Master; B		
3-14	*5800442900	Bracket, Mic	M-50	
3-15	*5200087400	PCB Assy, LED; B		
3-16	*5800370100	Plate, Lever Switch	M-50	
3-17	5284006300	Variable Resistor, Slide; 10kΩ (A) x 2		
3-18	5283006200	Variable Resistor, Slide; 10kΩ (A)		
3-19	5284007400	Variable Resistor, Slide; 10kΩ (A)		5284008700
3-20	*5800443000	Plate, Selector PCB	M-50	
3-21	5800540500	Knob N, B (Gray)		
3-22	5800540400	Knob N, A (Ivory)		
3-23	*5200107800	PCB Assy, SW; E		
3-24	*5122222000	Connector Socket, 3P (BLK)		
3-25	*5122227000	Connector Socket, 8P (BLK)		
3-26	*5122286000	Connector Socket, 8P (RED)		
3-27	*5122170000	Connector Socket, 8P (WHT)		
3-28	*5122167000	Connector Socket, 5P (WHT)		
3-29	*5122165000	Connector Socket, 3P (WHT)		
3-30	*5200086820	PCB Assy, MONITOR AMPL.; A-3		
3-31	*5200086830	PCB Assy, MONITOR AMPL.; A-4		
3-32	*5336109300	Connector Socket, 3P (YEL)		
3-33	*5122223000	Connector Socket, 4P (BLK)		
3-34	*5122166000	Connector Socket, 4P (WHT)		
3-50	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
3-51	*5780033006	Screw, Bind Sems A M3 x 6		
3-52	*5534118000	Rivet, Push		

Parts marked with * require longer delivery time.

2-4. Exploded View-4 (Buss Ampl.) [M-512]



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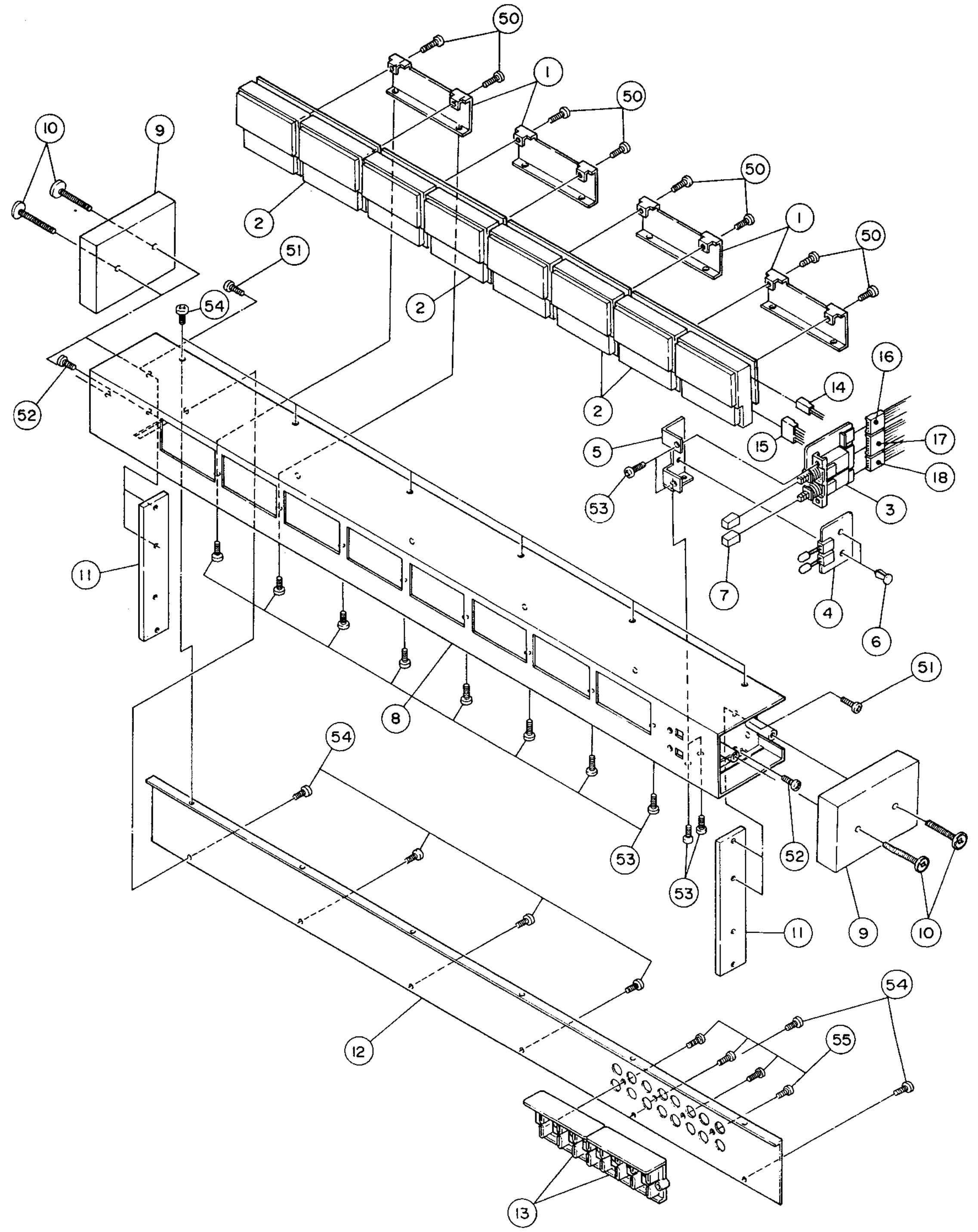
Exploded View – 4 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
4- 1	6006056100	Cap, Knob (Red)	M-5	
4- 2	6006058100	Cap, Knob (Green)	M-5	
4- 3	6006054100	Cap, Knob (Ivory)	M-5	
4- 4	6006057100	Cap, Knob (Blue)	M-5	
4- 5	5800382900	Knob, B-15D		
4- 6	5800543000	Knob, Fader; C (Red)		
4- 7	5800403300	Knob, Lever Switch	M-50	
4- 8	*5800383100	Escutcheon; Mic		
4- 9	*5800380900	Plate, Name	M-50	
4-10	5800542200	Knob, Fader; A (Yellow)		
4-11	*5800559400	Panel, Talkback; B		
4-12	*5800317400	Mask, Slide Vol. (100 mm)		
4-13	*5800384800	Mask, Lever Switch; B	M-50	
4-14	*5800266400	Mask, Slide Vol. (60 mm)		
4-15	*5800535700	Escutcheon, Power Button		
4-16	*5800443500	Bracket, Buss Ampl. PCB	M-50	
4-17	*5786740100	Bush		
4-18	*5800537700	Chassis Assy, Master; B		
4-19	*5800273000	Hinge, PCB	V-1RX	
4-20		(Not Used)		
4-21	5124026000	Jack, PHONES		
4-22	5800540500	Knob N, B (Gray)		
4-23	5800540400	Knob N, A (Ivory)		
4-24	5282408500	Variable Resistor, 10kΩ (A) x 2		
4-25	*5800370100	Plate, lever Switch	M-50	
4-26	5282011600	Variable Resistor, 10kΩ (A)		
4-27	5284006300	Variable Resistor, Slide; 10kΩ (A) x 2		
4-28	5284007400	Variable Resistor, Slide; 10kΩ (A)	5284008700	
4-29	*5800442900	Bracket, Mic	M-50	
4-30	*6055017000	Mic, EM10PB		
4-31	*5200133100	PCB Assy, TALKBACK		
4-32	*5800443200	Support, Monitor PCB		
4-33	*5200086910	PCB Assy, MONITOR AMPL.; B		
4-34	*5800537600	Bracket, Monitor PCB		
4-35	*5800443100	Support, Buss Ampl.	M-50	
4-36	*5200086610	PCB Assy, BUSS AMPL.		
4-37	*5122174000	Connector Socket, 12P (WHT)		
4-38	*5122166000	Connector Socket, 4P (WHT)		
4-39	*5122164000	Connector Socket, 2P (WHT)		
4-40	*5122165000	Connector Socket, 3P (WHT)		
4-41	*5122167000	Connector Socket, 5P (WHT)		
4-42	*5122168000	Connector Socket, 6P (WHT)		
4-43	*5122170000	Connector Socket, 8P (WHT)		
4-44	*5122281000	Connector Socket, 3P (RED)		
4-45	*5122222000	Connector Socket, 3P (BLK)		
4-50	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
4-51	*5780033006	Screw, Bind Sems A M3 x 6		
4-52	*5780003006	Screw, Bind M3 x 6		

Parts marked with * require longer delivery time.

2-5. Exploded View-5 (Meter Section) [M-512]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Exploded View – 5 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
5- 1	*5800369901	Plate, Mounting Meter	M-50	
5- 2	*5200087602	PCB Assy, METER		
5- 3	*5200138600	PCB Assy, EXT SW		
5- 4	*5200138500	PCB Assy, EXT LED		
5- 5	*5800381000	Plate, Switch; 2P	M-50	
5- 6	*5534118000	Rivet, Push		
5- 7	5800541000	Knob J, A (Ivory)		
5- 8	*5800537301	Chassis Assy, Meter; C		
5- 9	*5800395200	Side Board, Meter	M-50	
5-10	*5504549000	Screw, M4 x 25		
5-11	*5800370800	Post, Meter		
5-12	*5800537500	Panel, Meter Rear; C		
5-13	*5200084400	PCB Assy, JACK		
5-14	*5336149200	Connector Socket, 2P (WHT)		
5-15	*5336149500	Connector Socket, 5P (WHT)		
5-16	*5122166000	Connector Socket, 4P (WHT)		
5-17	*5122171000	Connector Socket, 9P (WHT)		
5-18	*5122223000	Connector Socket, 4P (BLK)		
5-50	*5781023008	Screw, Tapping M3 x 8		
5-51	*5783084008	Screw, C Tite M4 x 8		
5-52	*5780044008	Screw, Bind Sems B M4 x 8		
5-53	*5780033006	Screw, Bind Sems A M3 x 6		
5-54	*5780973008	Screw, Tapping Tras (BLK) M3 x 8		
5-55	*5781073008	Screw, Tapping (BLK) M3 x 8		

Parts marked with * require longer delivery time.

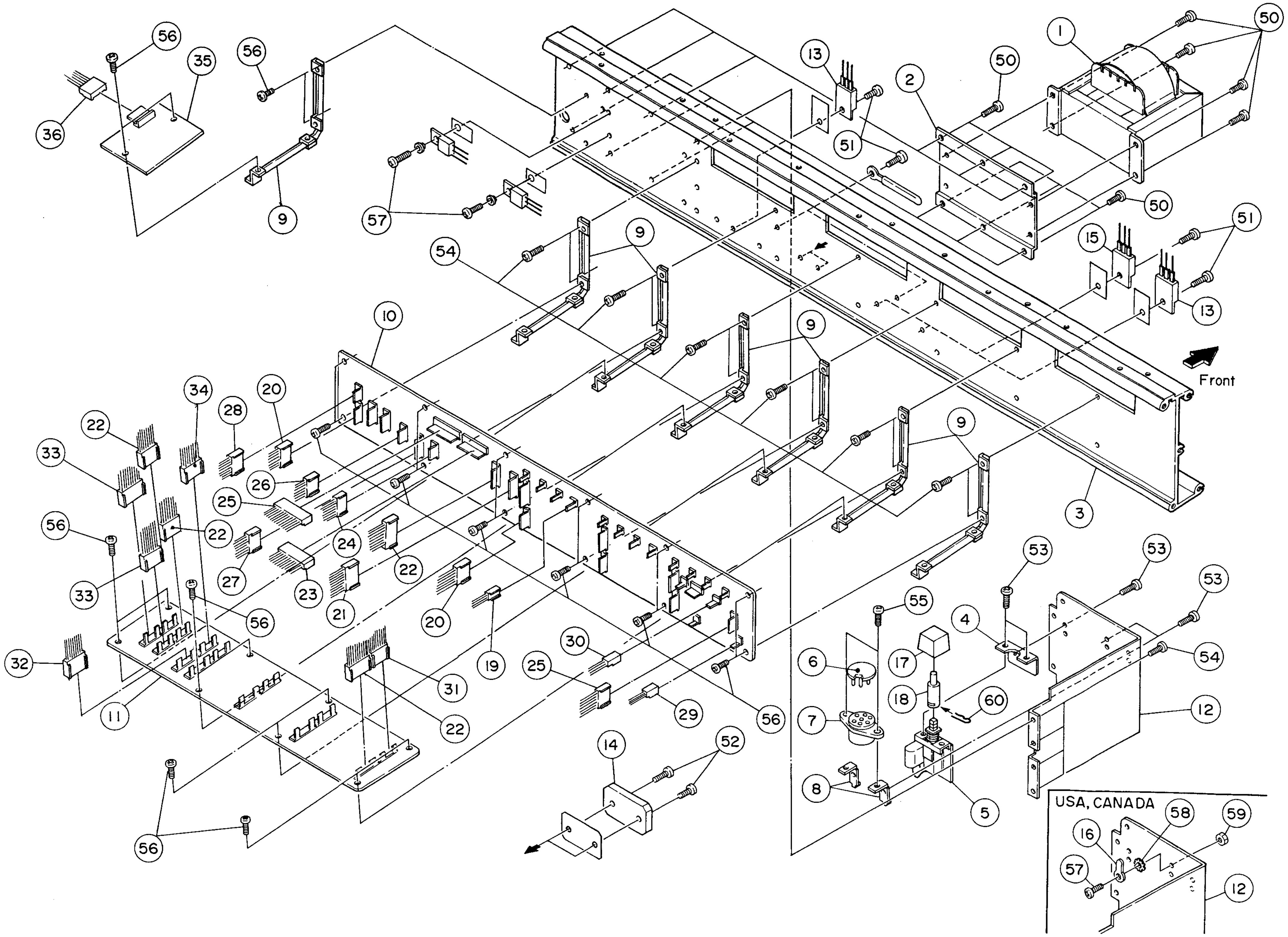
Exploded View – 6 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
6- 1	⚠ 5320026500	Transformer, Power [J]		
	⚠ 5320026600	Transformer, Power [U, C]		
	⚠ 5320026700	Transformer, Power [GE]		
	⚠ 5320026800	Transformer, Power [E, UK, A]		
6- 2	*5800370000	Plate, Transformer		
6- 3	*5800538600	Chassis, Main; C		
6- 4	*5800362500	Bracket, Power Switch	PE-40	
6- 5	*5200127000	PCB Assy, POWER SW [J]		
	*5200127010	PCB Assy, POWER SW [U]		
	*5200127020	PCB Assy, POWER SW [C]		
	*5200127030	PCB Assy, POWER SW [GE]		
	*5200127041	PCB Assy, POWER SW [E, UK, A]		
6- 6	⚠ 5043299000	Plug, Voltage Selector [GE]		
6- 7	⚠ 5332014400	Socket, Voltage Selector [GE]		
6- 8	*5800136900	Bracket, Voltage Selector [GE]	MM-20	
6- 9	*5800371800	Plate, Buss PCB	M-50	
6-10	*5200088102	PCB Assy, MOTHER; B		
6-11	*5200088000	PCB Assy, MOTHER; A		
6-12	*5800557700	Shield Plate, Transformer		
6-13	⚠ 5230779400	Transistor, 2SC3181 (O); Q4, Q6		
6-14	⚠ 5230506400	Transistor, 2SB755 (O); Q10		
6-15	⚠ 5230017700	Transistor, 2SA1264 (O); Q3		
6-16	*5786700400	Lug, GND [U, C]		
6-17	5800173100	Button, Power Switch	133	
6-18	*5534713000	Rod, C	X-10R	
6-19	*5122164000	Connector Socket, 2P (WHT)		
6-20	*5122285000	Connector Socket, 7P (RED)		
6-21	*5122227000	Connector Socket, 8P (BLK)		
6-22	*5122170000	Connector Socket, 8P (WHT)		
6-23	*5122231000	Connector Socket, 12P (BLK)		
6-24	*5122166000	Connector Socket, 4P (WHT)		
6-25	*5122290000	Connector Socket, 12P (RED)		
6-26	*5122168000	Connector Socket, 6P (WHT)		
6-27	*5122169000	Connector Socket, 7P (WHT)		
6-28	*5122283000	Connector Socket, 5P (RED)		
6-29	*5122221000	Connector Socket, 2P (BLK)		
6-30	*5122280000	Connector Socket, 2P (RED)		
6-31	*5122174000	Connector Socket, 12P (WHT)		
6-32	*5336109200	Connector Socket, 8P (YEL)		
6-33	*5122286000	Connector Socket, 8P (RED)		
6-34	*5336110200	Connector Socket, 12P (YEL)		
6-35	*5200139700	PCB Assy, REGULATOR		
6-36	*5122282000	Connector Socket, 4P (RED)		

REF. NO.	PARTS NO.	DESCRIPTION
6-50	*5780034008	Screw, Bind Sems A M4 x 8
6-51	*5780003010	Screw, Bind M3 x 10
6-52	*5783003006	Screw, S Tite M3 x 8
6-53	*5780033006	Screw, Bind Sems A M3 x 6
6-54	*5781023008	Screw, Tapping M3 x 8
6-55	*5780033008	Screw, Bind Sems A M3 x 8 [GE]
6-56	*5780003006	Screw, Bind M3 x 6
6-57	*5780003008	Screw, Bind M3 x 8
6-58	*5785123000	Washer, Lock [U, C]
6-59	*5781823000	Nut, M3 [U, C]
6-60	*5786360600	Pin, Snap ϕ6

Parts marked with * require longer delivery time.

2-6. Exploded View-6 (Mother PCBs) [M-512]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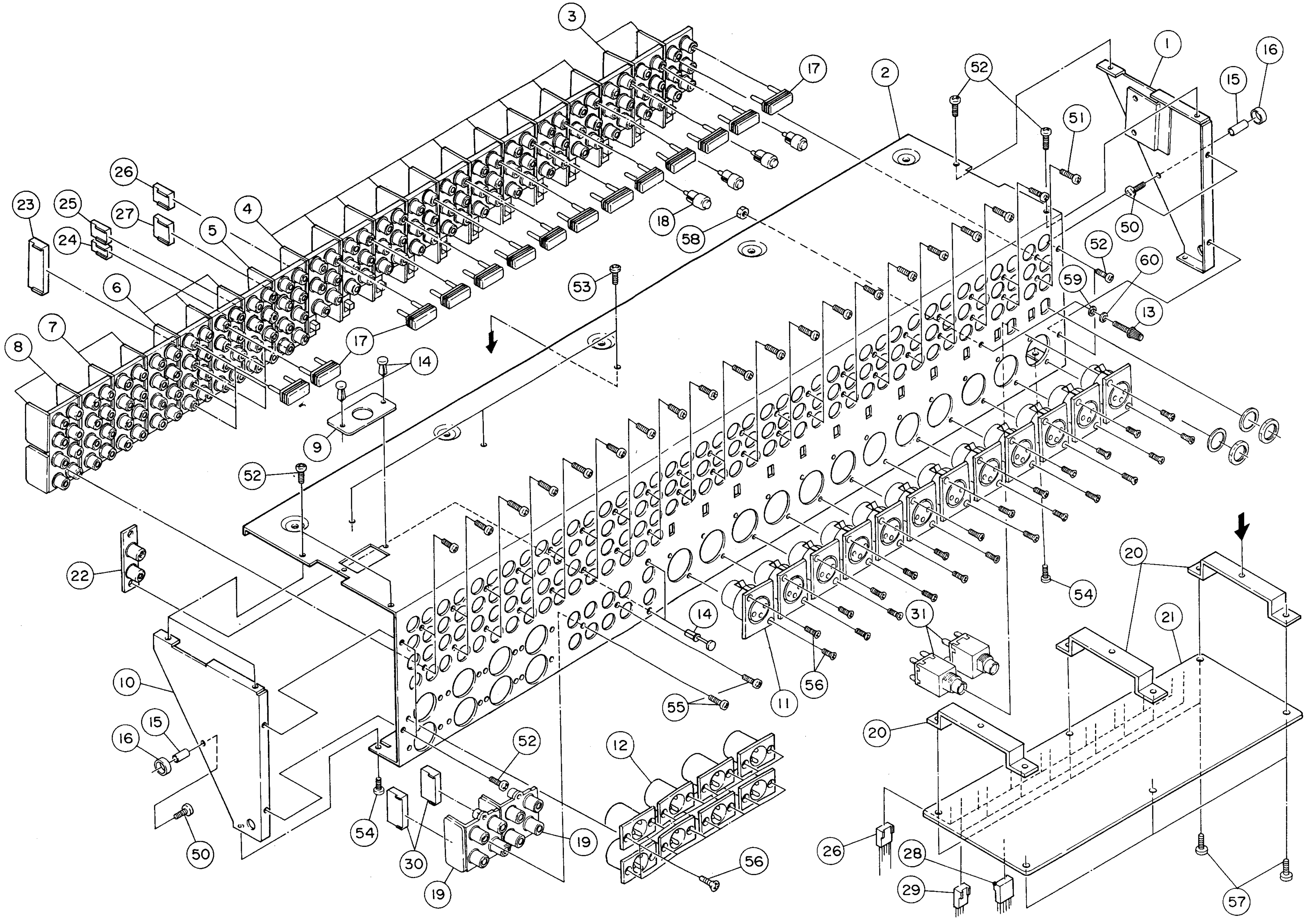
Exploded View-7 (Rear Panel) [M-512]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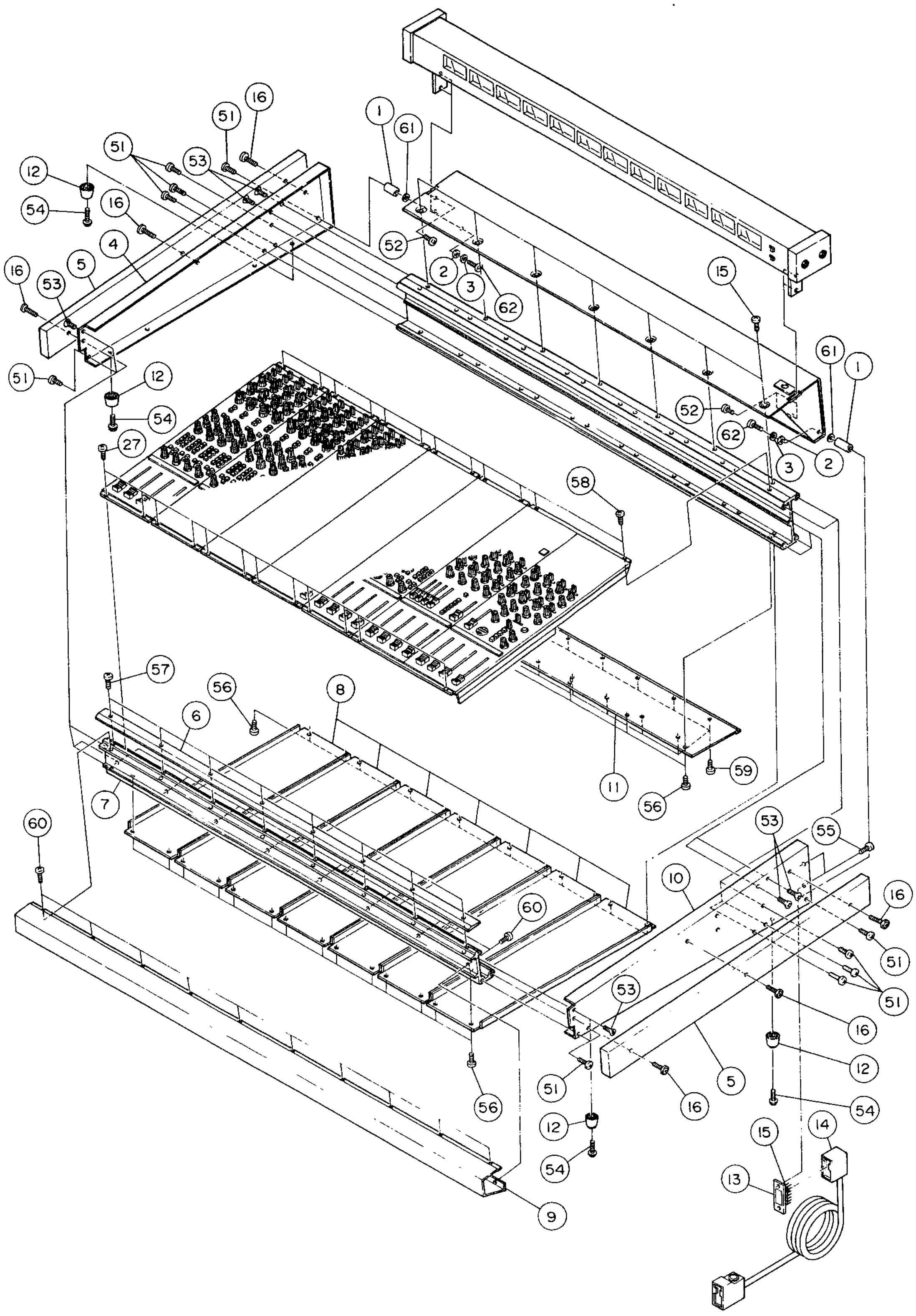
Exploded View – 7 [M-512]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
7- 1	*5800395501	Plate Assy, Rear; L	M-50	
7- 2	*5800538700	Panel, Rear; C		
7- 3	*5200088500	PCB Assy, IN/OUTPUT; A (Included INST IN Jack)		
7- 4	*5200088510	PCB Assy, IN/OUTPUT; A		
7- 5	*5200095100	PCB Assy, IN/OUTPUT; B-A		
7- 6	*5200095110	PCB Assy, IN/OUTPUT; B-B		
7- 7	*5200095120	PCB Assy, IN/OUTPUT; B-C		
7- 8	*5200095130	PCB Assy, IN/OUTPUT; B-D		
7- 9	*5800395700	Plate, Cable	M-50	
7-10	*5800395601	Plate Assy, Rear; R	M-50	
7-11	5334027300	Connector, Cannon; XLB-31		
7-12	5334027200	Connector, Cannon; XLB-32		
7-13	*5045407100	Terminal, GND		
7-14	*5534118000	Rivet, Push		
7-15	*5800443300	Stopper, Rear Panel	M-50	
7-16	*6014803000	Damper	85-16	
7-17	5330507500	Shorting Bar, 2P	M-50	
7-18	6052202000	Shorting Pin	M-3	
7-19	*5200108120	PCB Assy, IN/OUTPUT; C		
7-20	*5800536700	Bracket, Balance PCB		
7-21	*5200128810	PCB Assy, IN/OUT AMPL		
7-22	5330508100	RCA Jack, 2P		
7-23	*5122174000	Connector Socket, 12P (WHT)		
7-24	*5122164000	Connector Socket, 2P (WHT)		
7-25	*5122165000	Connector Socket, 3P (WHT)		
7-26	*5122281000	Connector Socket, 3P (RED)		
7-27	*5122166000	Connector Socket, 4P (WHT)		
7-28	*5336109300	Connector Socket, 3P (YEL)		
7-29	*5122280000	Connector Socket, 2P (RED)		
7-30	*5122170000	Connector Socket, 8P (WHT)		
7-31	*5043297000	Jack		
7-50	*5780033006	Screw, Bind Sems A M3 × 6		
7-51	*5781063008	Screw, Tapping (BLK) M3 × 8		
7-52	*5780023006	Screw, Bind (BLK Ni) M3 × 6		
7-53	*5780423006	Screw, Tras (BLK Ni) M3 × 6		
7-54	*5783593006	Screw, C Tite M3 × 6		
7-55	*5781063008	Screw, Tapping (BLK) M3 × 8		
7-56	*5783503006	Screw, Flat S Tite (Ni) M3 × 6		
7-57	*5780003006	Screw, Bind M3 × 6		
7-58	*5781824000	Nut, M4		
7-59	*5785004000	Washer, ϕ4.5 × ϕ8 × t0.5		
7-60	*5785114000	Washer, Lock ϕ4		

Parts marked with * require longer delivery time.

2-8. Exploded View-8 (Main Frame) [M-520]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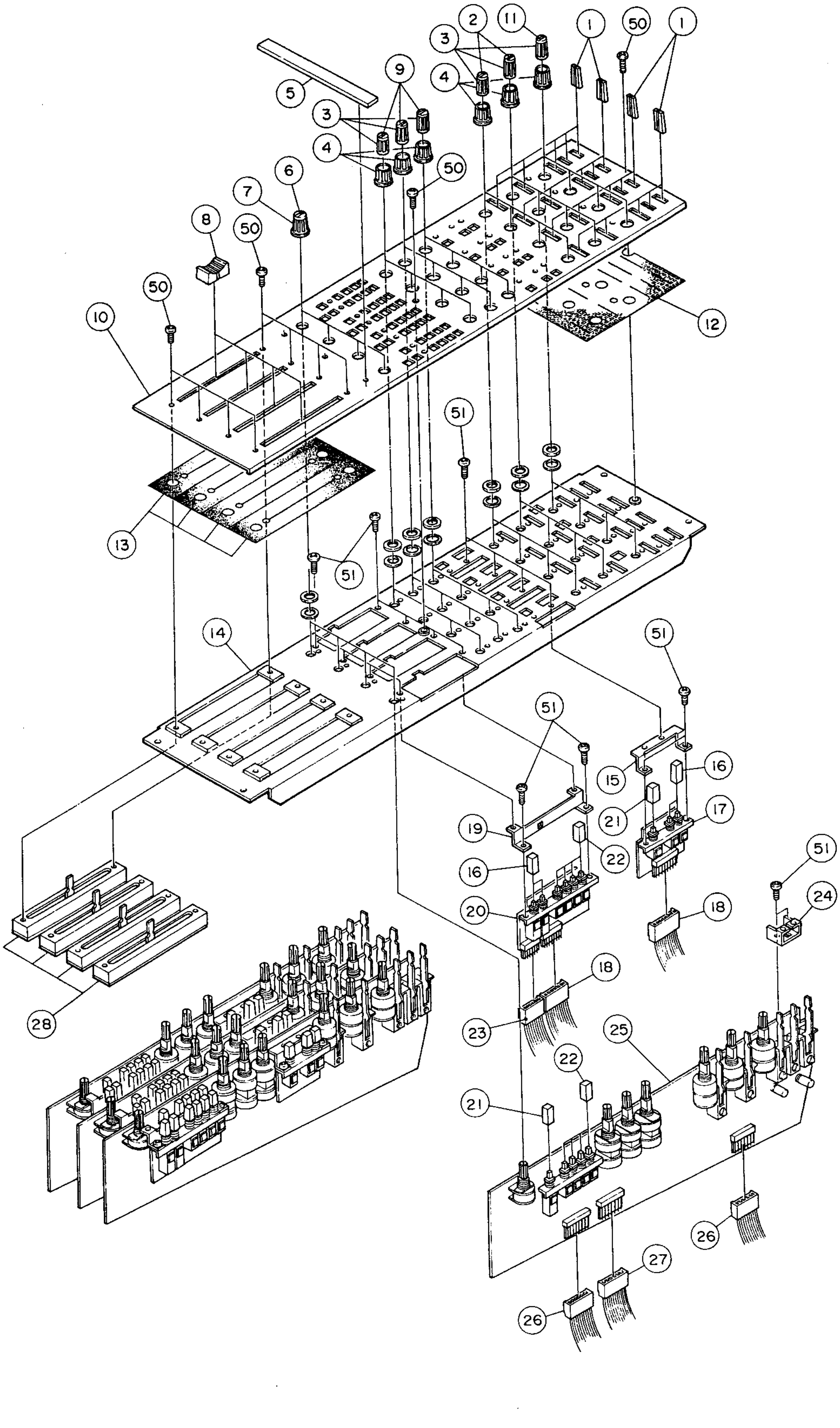
Exploded View – 8 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
8- 1	*5800370700	Collar, Rear; A	M-50	
8- 2	*5022121000	Spring, Hold Bearing		
8- 3	*5800395100	Collar, Rear; B	M-50	
8- 4	*5800539400	Chassis, Side; B (L)		
8- 5	*5800535500	Board, Side; B		
8- 6	*5800536000	Plate, Number; B		
8- 7	*5800539500	Sash, Flont; B		
8- 8	*5800537900	Chassis, Rear; A		
8- 9	*5800536800	Pad Assy, B		
8-10	*5800557900	Chassis, Side; C (R)		
8-11	*5800538100	Chassis, Rear; C		
8-12	*5534596000	Foot		
8-13	*5800557100	Bracket, Connector		
8-14	⚠ 5350507400	Cord Assy, Connector		
8-15	6052316000	Connector, 20P; Male		
8-16	*5504549000	Screw, M4 x 25		
8-50	*5780424006	Screw, Tras (BLK Ni) M4 x 6		
8-51	*5780424012	Screw, Tras (BLK Ni) M4 x 12		
8-52	*5783084008	Screw, C Tite A M4 x 8		
8-53	*5780204012	Screw, F, Countersunk M4 x 12		
8-54	*5780054014	Screw, Bind Sems F M4 x 14		
8-55	*5781073008	Screw, Tapping (BLK) M3 x 8		
8-56	*5781023008	Screw, Tapping M3 x 8		
8-57	*5780023006	Screw, Bind (BLK Ni) M3 x 6		
8-58	*5780034008	Screw, Bind Sems A M4 x 8		
8-59	*5780003006	Screw, Bind M3 x 6		
8-60	*5781123008	Screw, Tapping M3 x 8		
8-61	*5785308000	Washer, $\phi 8 \times \phi 12 \times t0.25$		
8-62	*5780034014	Screw, Bind Sems A M4 x 14		

Parts marked with * require longer delivery time.

2-9. Exploded View-9 (Input Ampl.) [M-520]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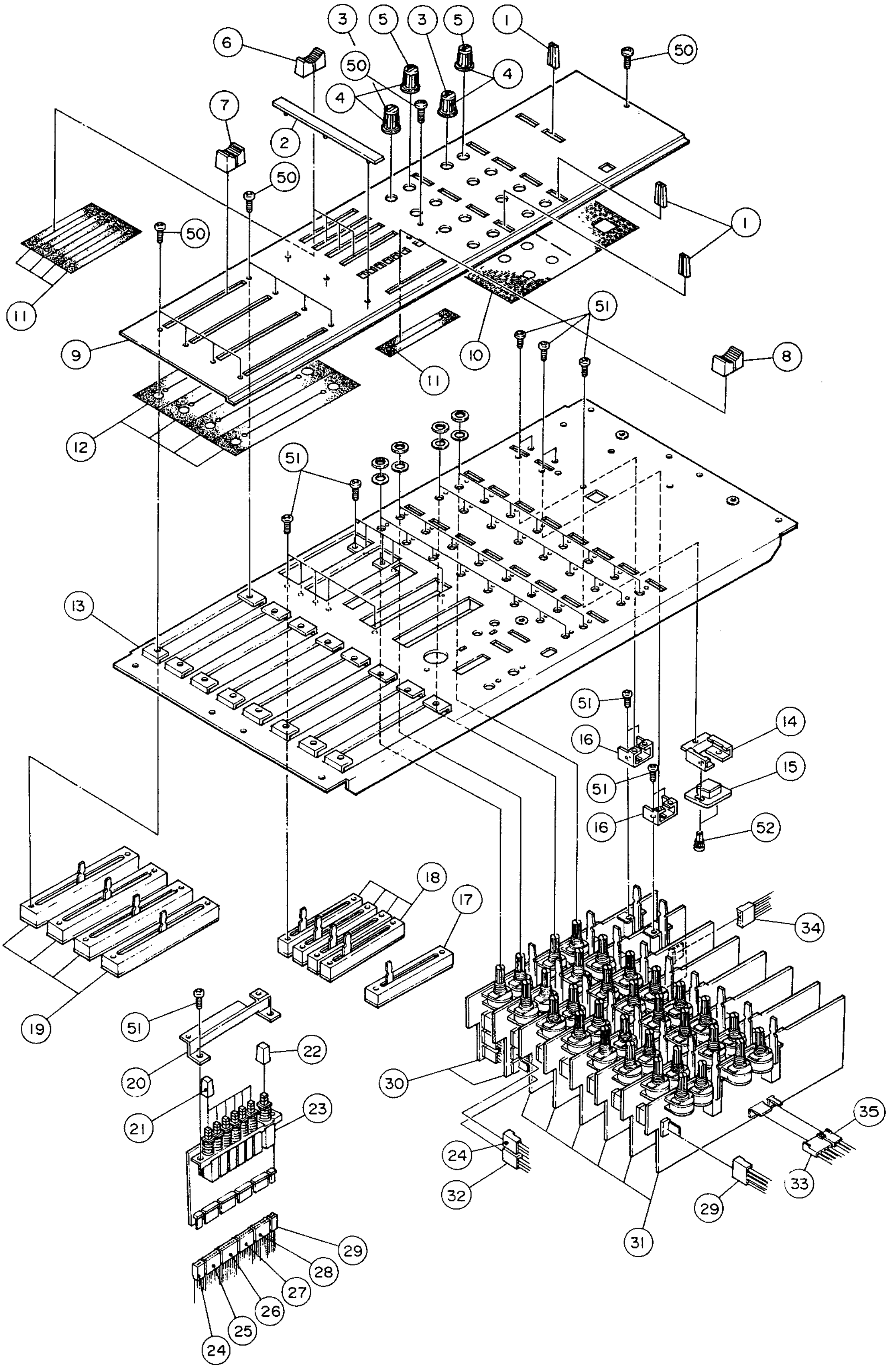
Exploded View – 9 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
9- 1	5800403300	Knob, Lever Switch	M-50	
9- 2	5800134200	Cap, Knob (Green)	M-50	
9- 3	5800382800	Knob, B-11D		
9- 4	5800383001	Knob, B-15W		
9- 5	*5800380900	Plate, Memo	M-50	
9- 6	6006054100	Cap, Knob (Ivory)	M-5	
9- 7	5800382900	Knob, B-15D		
9- 8	5800542800	Knob, Fader; A (Yellow)		
9- 9	5800133900	Cap, Knob (Orange)	M-50	
9-10	*5800559200	Panel, Input; B3 (Chan. 1 ~ 4)		
	*5800559100	Panel, Input; B2 (Chan. 5 ~ 16)		
	*5800559000	Panel, Input; B1 (Chan. 17 ~ 20)		
9-11	5800134000	Cap, Knob (Red)	M-50	
9-12	*5800385200	Mask, Lever, Switch; C	M-50	
9-13	*5800317400	Mask, Slide Vol. (100 mm)		
9-14	*5800537800	Chassis Assy, Input; B		
9-15	*5800370302	Plate, Push Switch; 4P	M-50	
9-16	5800541100	Knob, J, B (Gray)		
9-17	*5210086301	PCB, SW (A)		
9-18	*5122174000	Connector Socket, 12P (WHT)		
9-19	*5800370400	Plate, Push Switch; 7P	M-50	
9-20	*5210086401	PCB, SW (B)		
9-21	5800541000	Knob J, A (Ivory)		
9-22	5800541600	Knob, Assign		
9-23	*5122168000	Connector Socket, 6P (WHT)		
9-24	*5800370100	Plate, Lever Switch	M-50	
9-25	*5200133000	PCB Assy, INPUT AMPL.; A (Chan. 1, 2)		
	*5200133010	PCB Assy, INPUT AMPL.; B (Chan. 3)		
	*5200133020	PCB Assy, INPUT AMPL.; C (Chan. 4)		
	*5200133030	PCB Assy, INPUT AMPL.; D (Chan. 5 ~ 11, 13 ~ 15)		
	*5200133040	PCB Assy, INPUT AMPL.; E (Chan. 8, 12, 16)		
	*5200133050	PCB Assy, INPUT AMPL.; F (Chan. 17 ~ 19)		
	*5200133060	PCB Assy, INPUT AMPL.; G (Chan. 20)		
9-26	*5122170000	Connector Socket; 8P (WHT)		
9-27	*5122169000	Connector Socket; 7P (WHT)		
9-28	5284007400	Variable Resistor, Slide; 10kΩ (A)		
9-50	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
9-51	*5780033006	Screw, Bind Sems A M3 x 6		

Parts marked with * require longer delivery time.

2-10. Exploded View-10 (Monitor Ampl.) [M-520]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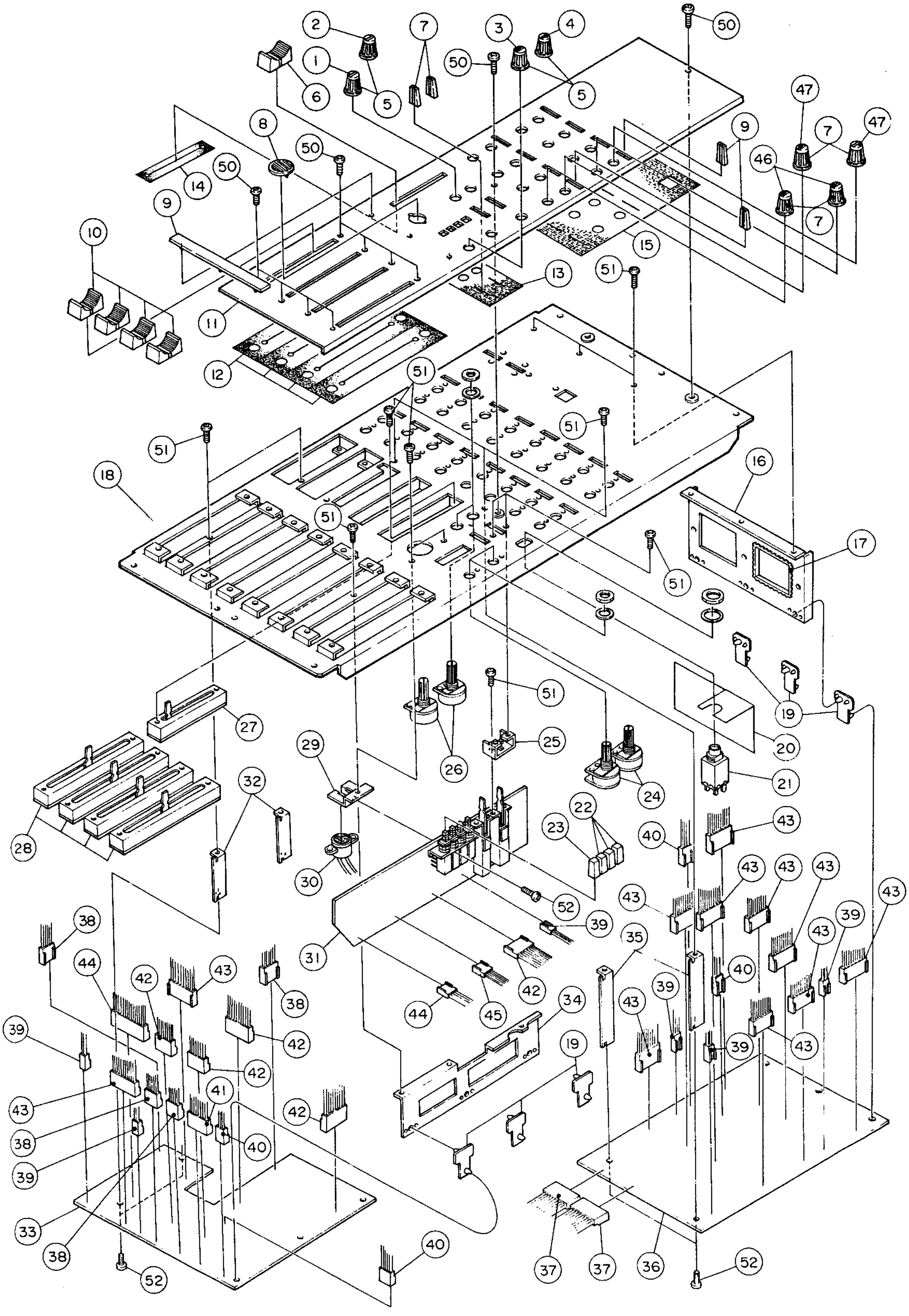
Exploded View – 10 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
10- 1	5800403300	Knob, Lever Switch	M-50	
10- 2	*5800380900	Plate, Memo	M-50	
10- 3	6006054100	Cap, Knob (Ivory)	M-5	
10- 4	5800382900	Knob, B-15D		
10- 5	6006055100	Cap, Knob (Yellow)	M-5	
10- 6	5800542200	Knob, Fader; A (Yellow)		
10- 7	5800542900	Knob, Fader; B (White)		
10- 8	5800543000	Knob, Fader; C (Red)		
10- 9	*5800559600	Panel, Monitor; C		
10-10	*5800558800	Mask, Lever Switch; E		
10-11	*5800266400	Mask, Slide Vol. (60 mm)		
10-12	*5800317400	Mask, Slide Vol. (100 mm)		
10-13	*5800558900	Chassis Assy, Master; C		
10-14	*5800442900	Bracket, Mic	M-50	
10-15	*5200087400	PCB Assy, LED; B		
10-16	*5800370100	Plate, Lever Switch		
10-17	5284006300	Variable Resistor, Slide; 10kΩ (A) × 2		
10-18	~~5283006200~~	Variable Resistor, Slide; 10kΩ (A) 52840062-00		
10-19	5284007400	Variable Resistor, Slide; 10kΩ (A)		
10-20	*5800443000	Plate, Selector PCB	M-50	
10-21	5800540500	Knob N, B (Gray)		
10-22	5800540400	Knob N, A (Ivory)		
10-23	*5200107800	PCB Assy, SW; E		
10-24	*5122222000	Connector Socket, 3P (BLK)		
10-25	*5122227000	Connector Socket, 8P (BLK)		
10-26	*5122286000	Connector Socket, 8P (RED)		
10-27	*5122170000	Connector Socket, 8P (WHT)		
10-28	*5122167000	Connector Socket, 5P (WHT)		
10-29	*5122165000	Connector Socket, 3P (WHT)		
10-30	*5200137300	PCB Assy, MONITOR AMPL.; A-1		
10-31	*5200137310	PCB Assy, MONITOR AMPL.; A-2		
10-32	*5336109300	Connector Socket, 3P (YEL)		
10-33	*5122223000	Connector Socket, 4P (BLK)		
10-34	*5122166000	Connector Socket, 4P (WHT)		
10-35	*5122164000	Connector Socket, 2P (WHT)		
10-50	*5780423006	Screw, Tras (BLK Ni) M3 × 6		
10-51	*5780033006	Screw, Bind Sems A M3 × 6		
10-52	*5534118000	Rivet, Push		

Parts marked with * require longer delivery time.

2-11. Exploded View-11 (Buss Ampl.) [M-520]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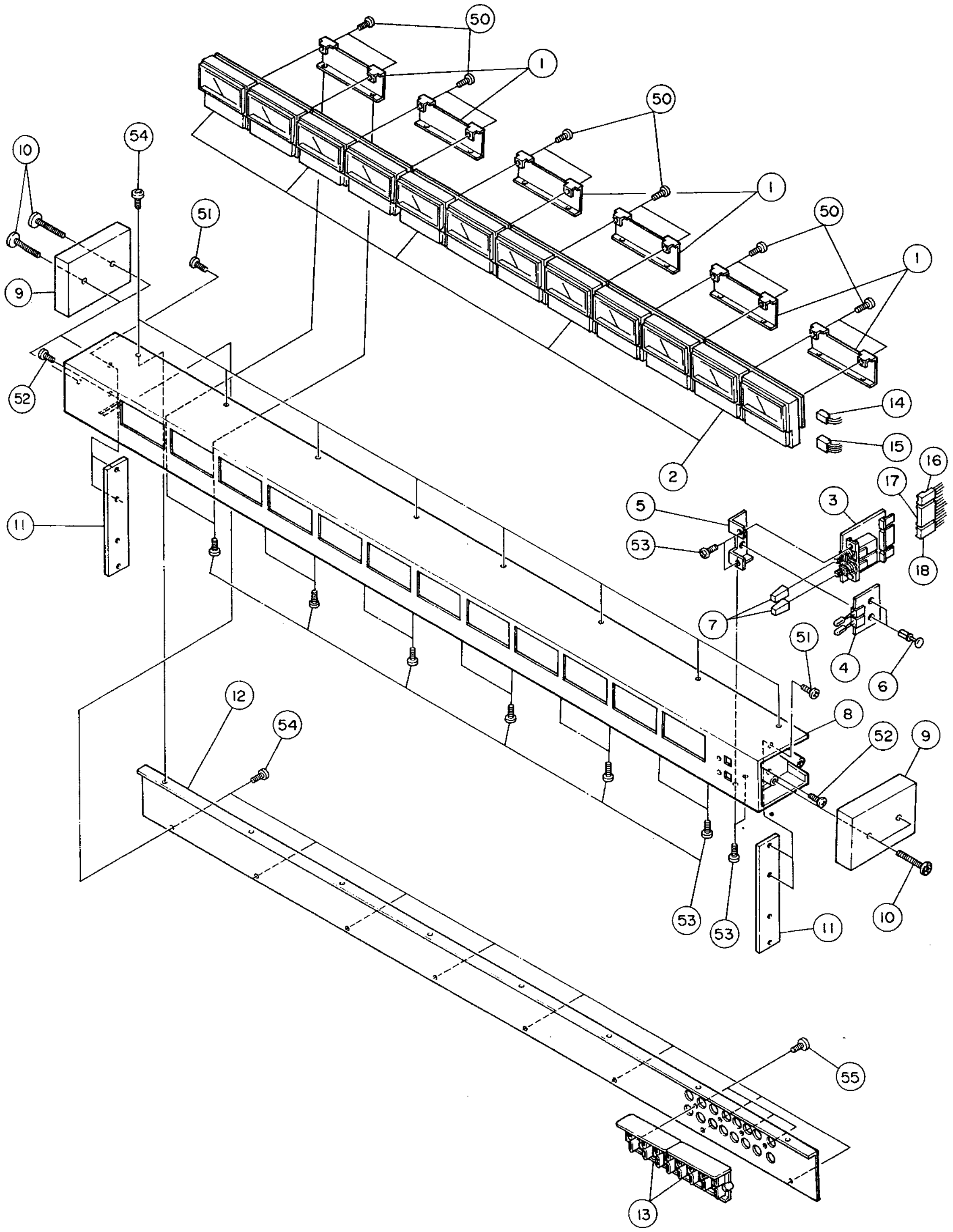
Exploded View – 11 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
11- 1	6006056100	Cap, Knob (Red)	M-5	
11- 2	6006058100	Cap, Knob (Green)	M-5	
11- 3	6006054100	Cap, Knob (Ivory)	M-5	
11- 4	6006057100	Cap, Knob (Blue)	M-5	
11- 5	5800382900	Knob, B-15D		
11- 6	5800543000	Knob, Fader; C (Red)		
11- 7	5800403300	Knob, Lever Switch	M-50	
11- 8	*5800383100	Escutcheon; Mic		
11- 9	*5800380900	Plate, Memo	M-50	
11-10	5800542200	Knob, Fader; A (Yellow)		
11-11	*5800559500	Panel, Talkback; C		
11-12	*5800317400	Mask, Slide Vol. (100 mm)		
11-13	*5800384800	Mask, Lever Switch; B	M-50	
11-14	*5800266400	Mask, Slide Vol. (60 mm)		
11-15	*5800558800	Mask, Lever Switch; E	M-09	
11-16	*5800443500	Bracket, Buss Ampl. PCB	M-50	
11-17	*5786740100	Bush		
11-18	*5800558900	Chassis Assy, Master; C		
11-19	*5800273000	Hinge, PCB		
11-20	*5800568700	Plate, Shield		
11-21	5124026000	Jack, PHONES		
11-22	5800540500	Knob N, B (Gray)		
11-23	5800540400	Knob N, A (Ivory)		
11-24	5282408500	Variable Resistor, 10kΩ (A) x 2		
11-25	*5800370100	Plate, lever Switch	M-50	
11-26	5282011600	Variable Resistor, 10kΩ (A)		
11-27	5284006300	Variable Resistor, Slide; 10kΩ (A) x 2		
11-28	5284007400	Variable Resistor, Slide; 10kΩ (A)		
11-29	*5780442900	Bracket, Mic		
11-30	*6055017000	Mic, EM10PB		
11-31	*5200133100	PCB Assy, TALKBACK		
11-32	*5800443200	Support, Monitor PCB; B	M-50	
11-33	*5200086920	PCB Assy, MONITOR AMPL.; B		
11-34	*5800537600	Bracket, Monitor PCB		
11-35	*5800443100	Support, Buss Ampl.	M-50	
11-36	*5200086620	PCB Assy, BUSS AMPL.		
11-37	*5122174000	Connector Socket, 12P (WHT)		
11-38	*5122166000	Connector Socket, 4P (WHT)		
11-39	*5122164000	Connector Socket, 2P (WHT)		
11-40	*5122165000	Connector Socket, 3P (WHT)		
11-41	*5122167000	Connector Socket, 5P (WHT)		
11-42	*5122168000	Connector Socket, 6P (WHT)		
11-43	*5122170000	Connector Socket, 8P (WHT)		
11-44	*5122281000	Connector Socket, 3P (RED)		
11-45	*5122222000	Connector Socket, 3P (BLK)		
11-46	6006054100	Cap, Knob (Ivory)	M-5	
11-47	6006055100	Cap, Knob (Yellow)	M-5	
11-50	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
11-51	*5780033006	Screw, Bind Sems A M3 x 6		
11-52	*5780003006	Screw, Bind M3 x 6		

Parts marked with * require longer delivery time.

2-12. Exploded View-12 (Meter Section) [M-520]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xploded View – 12 [M-520]

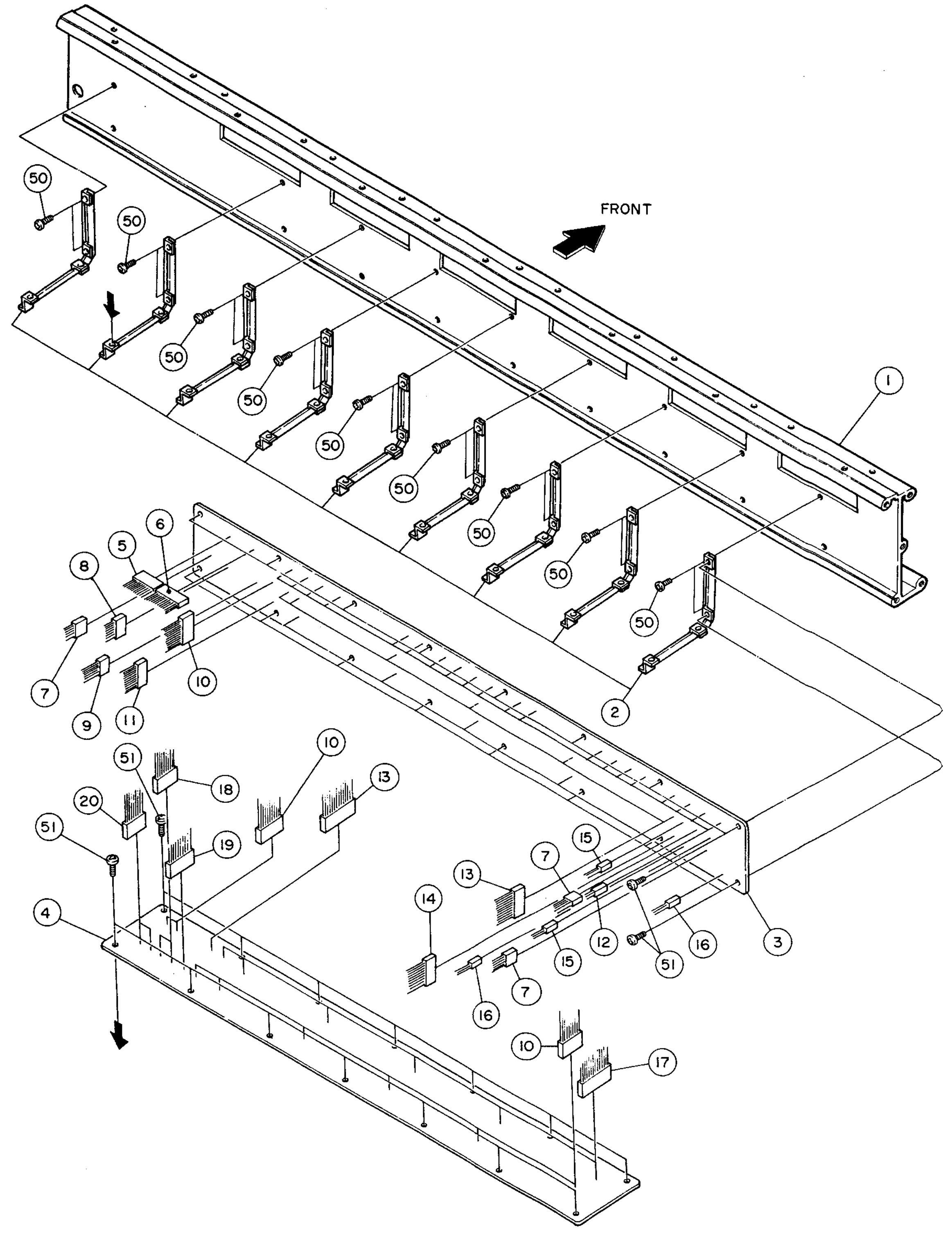
REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
12- 1	*5800369901	Plate, Mounting; Meter	M-50	
12- 2	*5200087602	PCB Assy, METER		
12- 3	*5200138600	PCB Assy, EXT SW		
12- 4	*5200138500	PCB Assy, EXT LED		
12- 5	*5800381000	Plate, Switch; 2P	M-50	
12- 6	*5534118000	Rivet, Push		
12- 7	5800541000	Knob J, A (Ivory)		
12- 8	*5800537200	Chassis Assy, Meter; B		
12- 9	*5800395200	Side Board, Meter	M-50	
12-10	*5504549000	Screw, M4 × 25		
12-11	*5800370800	Post, Meter	M-50	
12-12	*5800537400	Panel, Meter Rear; B		
12-13	*5200084400	PCB Assy, JACK		
12-14	*5336149200	Connector Socket, 2P (WHT)		
12-15	*5336149500	Connector Socket, 5P (WHT)		
12-16	*5122166000	Connector Socket, 4P (WHT)		
12-17	*5122171000	Connector Socket, 9P (WHT)		
12-18	*5122223000	Connector Socket, 4P (BLK)		
12-50	*5781023008	Screw, Tapping M3 × 8		
12-51	*5783084008	Screw, C Tite M4 × 8		
12-52	*5780044008	Screw, Bind Sems B M4 × 8		
12-53	*5780033006	Screw, Bind Sems A M3 × 6		
12-54	*5780973008	Screw, Tapping Tras (BLK) M3 × 8		
12-55	*5781073008	Screw, Tapping (BLK) M3 × 8		

xploded View – 13 [M-520]

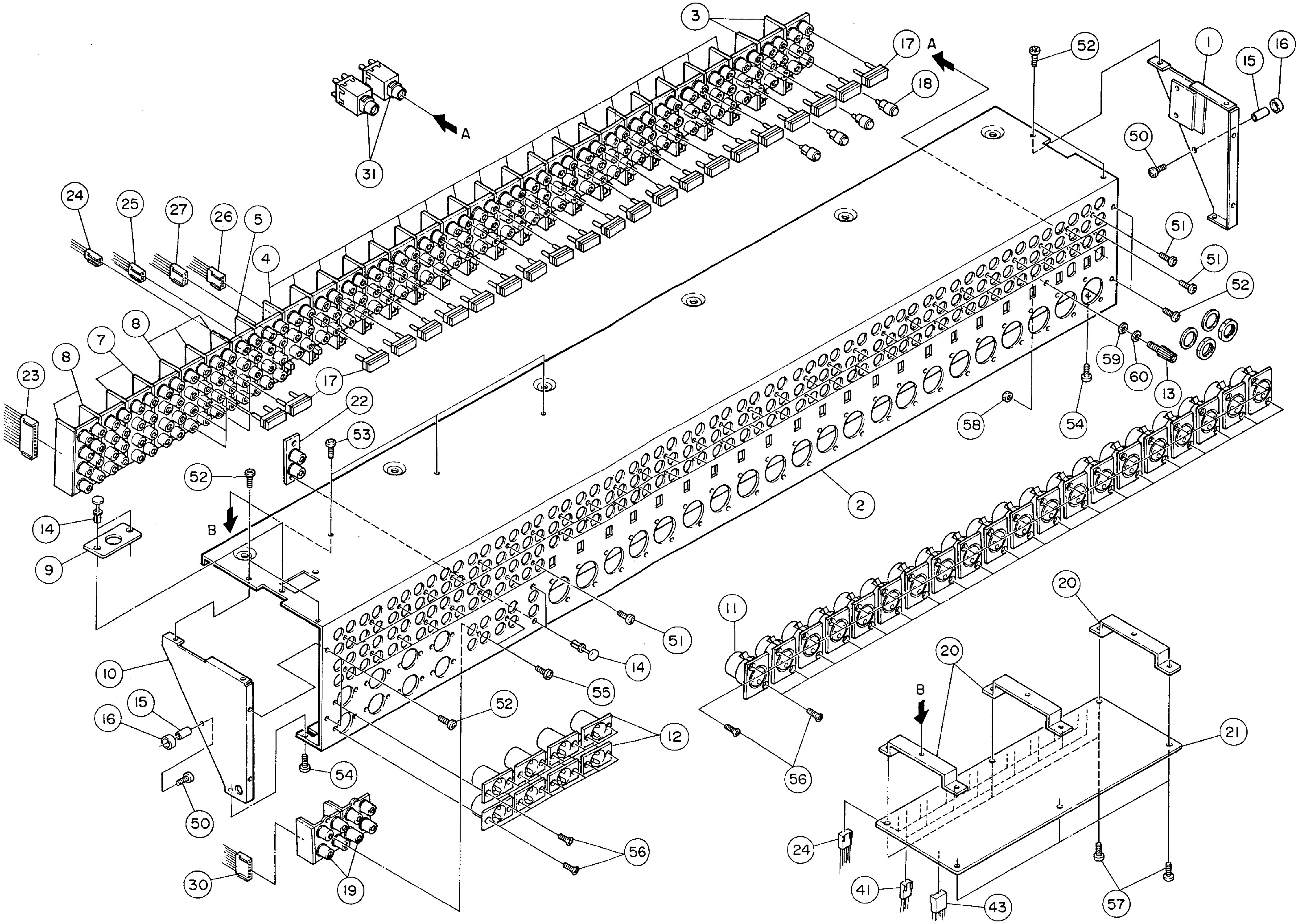
REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
13- 1	*5800539600	Sash, Main; B		
13- 2	*5800371800	Plate, Mother PCB	M-50	
13- 3	*5200132800	PCB Assy, MOTHER; B		
13- 4	*5200132700	PCB Assy, MOTHER; A		
13- 5	*5122290000	Connector Socket, 12P (RED)		
13- 6	*5122231000	Connector Socket, 12P (BLK)		
13- 7	*5122166000	Connector Socket, 4P (WHT)		
13- 8	*5122168000	Connector Socket, 6P (WHT)		
13- 9	*5122282000	Connector Socket, 4P (RED)		
13-10	*5122170000	Connector Socket, 8P (WHT)		
13-11	*5122169000	Connector Socket, 7P (WHT)		
13-12	*5122164000	Connector Socket, 2P (WHT)		
13-13	*5122227000	Connector Socket, 8P (BLK)		
13-14	*5122285000	Connector Socket, 7P (RED)		
13-15	*5122280000	Connector Socket, 2P (RED)		
13-16	*5122221000	Connector Socket, 2P (BLK)		
13-17	*5122174000	Connector Socket, 12P (WHT)		
13-18	*5336110200	Connector Socket, 12P (YEL)		
13-19	*5336109800	Connector Socket, 8P (YEL)		
13-20	*5122286000	Connector Socket, 8P (RED)		
13-50	*5781023008	Screw, Tapping M3 × 8		
13-51	*5780003006	Screw, Bind M3 × 6		

rts marked with * require longer delivery time.

2-13. Exploded View-13 (Mother PCBs) [M-520]



Exploded View-14 (Rear Panel) [M-520]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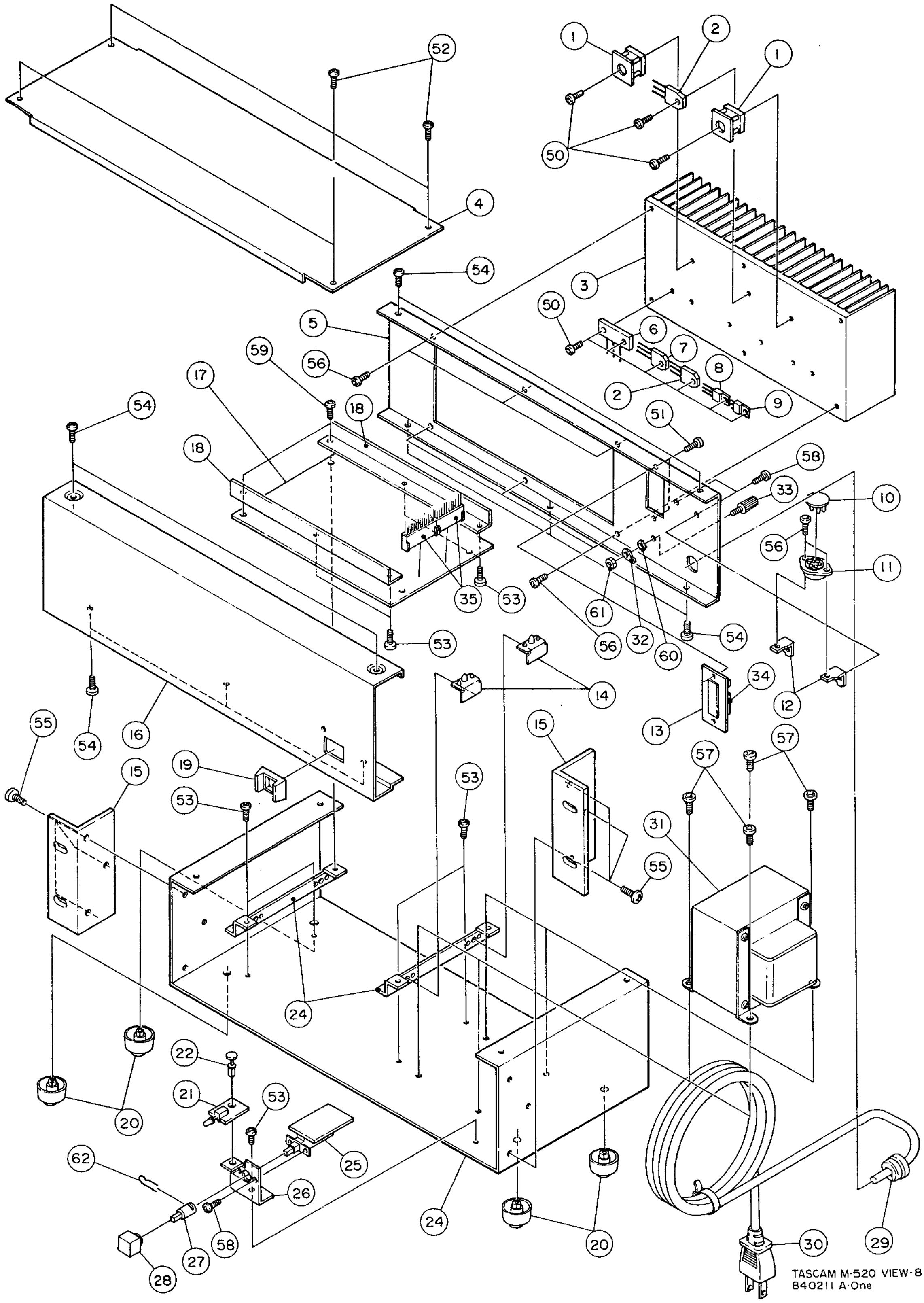
Exploded View – 14 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
14- 1	*5800395501	Plate Assy, Rear; L	M-50	
14- 2	*5800539700	Panel, Rear; B		
14- 3	*5200088500	PCB Assy, IN/OUTPUT; A (Included INST IN Jack)		
14- 4	*5200088510	PCB Assy, IN/OUTPUT; A		
14- 5	*5200095100	PCB Assy, IN/OUTPUT; B-A		
14- 6	*5200095110	PCB Assy, IN/OUTPUT; B-B		
14- 7	*5200095120	PCB Assy, IN/OUTPUT; B-C		
14- 8	*5200095130	PCB Assy, IN/OUTPUT; B-D		
14- 9	*5800395700	Plate, Cable	M-50	
14-10	*5800395601	Plate Assy, Rear; R	M-50	
14-11	5334027300	Connector, Cannon; XLB-31		
14-12	5334027200	Connector, Cannon; XLB-32		
14-13	*5045407100	Terminal, GND		
14-14	*5534118000	Rivet, Push		
14-15	*5800443300	Stopper, Rear Panel	M-50	
14-16	*6014803000	Damper	85-16	
14-17	5330507500	Shorting Bar, 2P	M-50	
14-18	6052202000	Shorting Pin	M-3	
14-19	*5200108120	PCB Assy, IN/OUTPUT; C		
14-20	*5800536700	Bracket, Balance PCB		
14-21	*5200128810	PCB Ass'y IN/OUT AMPL.		
14-22	5330508100	RCA Jack; 2P	234	
14-23	*5122174000	Connector Socket, 12P (WHT)		
14-24	*5122164000	Connector Socket, 2P (WHT)		
14-25	*5122165000	Connector Socket, 3P (WHT)		
14-26	*5122281000	Connector Socket, 3P (RED)		
14-27	*5122166000	Connector Socket, 4P (WHT)		
14-28	*5336109300	Connector Socket, 3P (YEL)		
14-29	*5122280000	Connector Socket, 2P (RED)		
14-30	*5122217000	Connector Socket, 8P (WHT)		
14-31	5043297000	Jack		
14-50	*5780033006	Screw, Bind Sems A M3 x 6		
14-51	*5781063008	Screw, Tapping (BLK) M3 x 8		
14-52	*5780023006	Screw, Bind (BLK Ni) M3 x 6		
14-53	*5780423006	Screw, Tras (BLK Ni) M3 x 6		
14-54	*5783593006	Screw, C Tite M3 x 6		
14-55	*5781063008	Screw, Tapping (BLK) M3 x 8		
14-56	*5783503006	Screw, Flat S Tite (Ni) M3 x 6		
14-57	*5780003006	Screw, Bind M3 x 6		
14-58	*5781824000	Nut, M4		
14-59	*5785004000	Washer, ϕ4.5 x ϕ8 x t0.5		
14-60	*5785114000	Washer, Lock ϕ4		

Parts marked with * require longer delivery time.

2-15. Exploded View-15 (Power Supply) [M-520]


1
2
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52
50
4
54
3
50
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7
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5
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2
9
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18
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18
51
58
33
10
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11
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53
61
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32
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34
14
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31
55
24
22
20
21
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62
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58
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30
29
TASCAM M-520 VIEW-8
840211 A·One

Exploded View – 15 [M-520]

REF. NO.	PARTS NO.	DESCRIPTION	COMMON MODELS	REMARKS
15- 1	*5200137900	PCB Assy, DIODE		
15- 2	⚠ 5230779400	Transistor, 2SC3181 (O)		
15- 3	*5800557400	Heatsink		
15- 4	*5800557200	Panel, Top		
15- 5	*5800557600	Panel, Rear		
15- 6	⚠ 5230506400	Transistor, 2SB755 (O)		
15- 7	⚠ 5230017700	Transistor, 2SA1264 (A)		
15- 8	⚠ 5220415700	IC, NJM7818A		
15- 9	⚠ 5220421900	IC, NJM7918A		
15-10	⚠ *5043299000	Voltage Selector, Plug [GE]		
15-11	⚠ *5332014400	Voltage Selector, Socket [GE]		
15-12	*5800136900	Plate, Selector [GE]	MM-20	
15-13	*5800557100	Plate, Connector		
15-14	*5800273000	Hing, PCB	V-1RX	
15-15	*5800557300	Angle, Rack		
15-16	*5800557500	Panel, Front		
15-17	*5200137600	PCB Assy, POWER SUPPLY [J, U, C, GE]		
	*5200137620	PCB Assy, POWER SUPPLY [E, UK, A]		
15-18	*5800556900	PCB Angle		
15-19	*5800535700	Protector, Button		
15-20	*5730002900	Foot		
15-21	*5200137800	PCB Assy, LED		
15-22	*5534118000	Push Rivet		
15-23	*5800557800	Chassis, Power		
15-24	*5800557000	Plate, PCB		
15-25	*5200137700	PCB Assy, POWER SWITCH [J]		
	*5200137710	PCB Assy, POWER SWITCH [U]		
	*5200137720	PCB Assy, POWER SWITCH [C]		
	*5200137730	PCB Assy, POWER SWITCH [GE]		
	*5200137740	PCB Assy, POWER SWITCH [E, UK, A]		
15-26	*5800556801	Bracket, Power Switch		
15-27	*5534713000	Rod, C	X-10R	
15-28	5800178100	Knob, Power Switch	133	
15-29	⚠ *5534660000	Strain Relief, AC Power Cord [All except C, UK]		
	⚠ *5317001800	Strain Relief, AC Power Cord [C]		
	⚠ *5317001700	Strain Relief, AC Power Cord [UK]		
15-30	⚠ *5128027000	Cord, AC Power [J]		
	⚠ *5350010800	Cord, AC Power [U, GE]		
	⚠ *5350008100	Cord, AC Power [C]		
	⚠ *5350008200	Cord, AC Power [E]		
	⚠ *5128047000	Cord, AC Power [UK]		
	⚠ *5350008300	Cord, AC Power [A]		
15-31	⚠ *5320028400	Power Transformer [J, U, C]		
	⚠ *5320028600	Power Transformer [GE, E, UK, A]		
15-32	*5786700600	Lug, GND ϕ4 [C]		
15-33	*5045407100	Terminal, GND		
15-34	*6052315000	Connector, 20P; Female		
15-35	*5336094500	Connector Socket, 5P (WHT)		

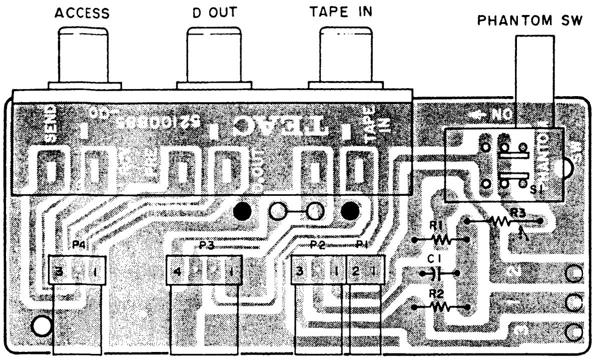
[U]: U.S.A.
[C]: CANADA
[GE]: GENERAL EXPORT
[A]: AUSTRALIA
[E]: EUROPE
[UK]: U.K.
[L]: LIMITED AREA
[J]: JAPAN

REF. NO.	PARTS NO.	DESCRIPTION
15-50	*5780043014	Screw, Bind Sems B M3 × 14
15-51	*5781073006	Screw, Tapping (BLK) M3 × 6
15-52	*5780023006	Screw, Bind (BLK Ni) M3 × 6
15-53	*5781023006	Screw, Tapping M3 × 6
15-54	*5780024006	Screw, Bind (BLK Ni) M4 × 6
15-55	*5780024008	Screw, Bind (BLK Ni) M4 × 8
15-56	*5780033008	Screw, Bind Sems A M3 × 8
15-57	*5780034008	Screw, Bind Sems A M4 × 8
15-58	*5780033006	Screw, Bind Sems A M3 × 6
15-59	*5780003008	Screw, Bind M3 × 8
15-60	*5785124000	Washer, Lock ϕ4
15-61	*5781824000	Nut, M4
15-62	*5786360600	Snap Pin ϕ6

Parts marked with * require longer delivery time.

3. ELECTRONICS – PCB'S AND ELECTRONIC COMPONENTS

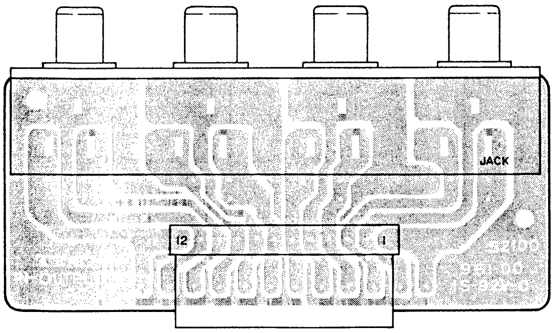
3-1. IN/OUTPUT A PCB (1, 2) Ass'y


ACCESS
D OUT
TAPE IN
PHANTOM SW
TEAC
SEND
TAPE IN
ON
PHANTOM
S1
R1
R2
R3
C1
P4
P3
P2
P1

IN/OUTPUT A PCB (1, 2) Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200088500	PCB Ass'y (1)
	*5200088510	PCB Ass'y (2)
	5210088500	PCB
R1, R2	5241340200	Resistor, Plate ohm, 6.8kΩ
R3	⚠ 5183578000	Resistor, Carbon 100Ω Nonflammable
C1	5260163150	Capacitor, Elec., 10 μF 100V
J1	5330507300	Pin Jack, 6P
S1	5300908900	Switch, Slide
P1	5122145000	Connector Plug, 2P (WHT)
P2	5122146000	Connector Plug, 3P (WHT)
P3	5122147000	Connector Plug, 4P (WHT)
P4	5122454000	Connector Plug, 3P (RED)
	5043297000	INST IN Jack (1 only)
	5800453400	Plate, Shield (2 only)
	5780003006	Screw, Bind, M3 x 6 (2 only)
	5781823000	Nut, M3 (2 only)

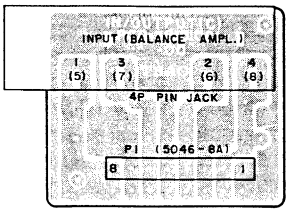
3-2. IN/OUTPUT B PCB (A, B, C, D) Ass'y



IN/OUTPUT B PCB (A, B, C, D) Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200095100	PCB Ass'y (A)
	*5200095110	PCB Ass'y (B)
	*5200095120	PCB Ass'y (C)
	*5200095130	PCB Ass'y (D)
	5210095100	PCB
	5330507200	Jack, 4P
	5122155000	Connector Plug, 12P (WHT)

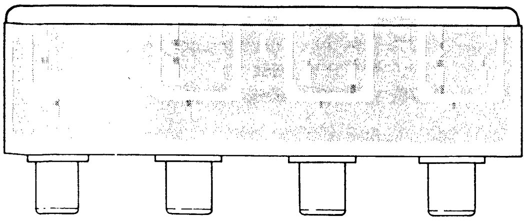
3-3. IN/OUTPUT C PCB (3) Ass'y


INPUT (BALANCE AMPL.)
1 (5)
3 (7)
2 (6)
4 (8)
4P PIN JACK
P1 (5046-8A)
8
1

IN/OUTPUT C PCB (3) Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200108120	PCB Ass'y (3)
	5210108100	PCB
	5330507200	Jack, 4P
P1	5122151000	Connector Plug, 8P

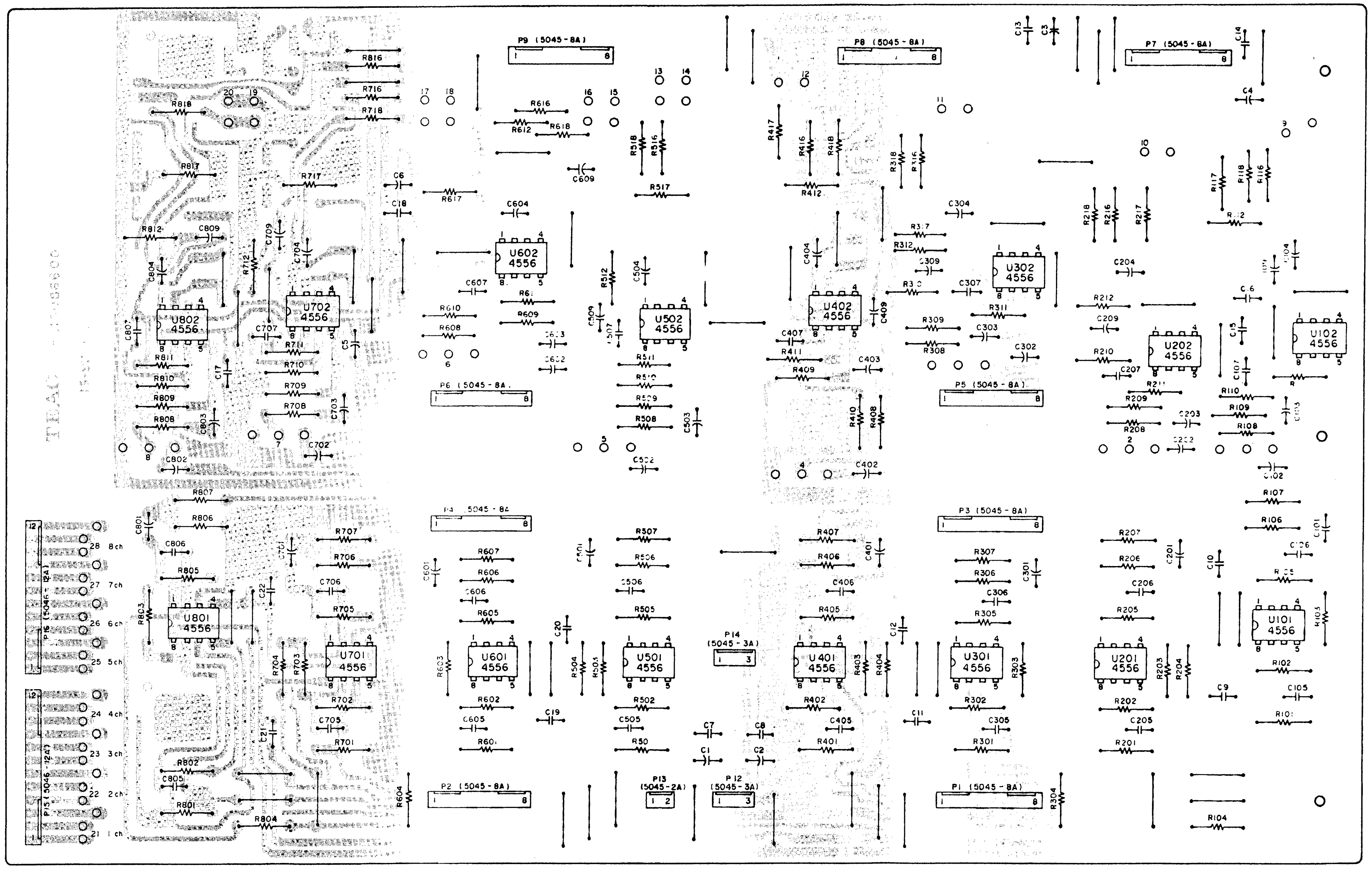
3-4. JACK PCB Ass'y



JACK PCB Ass'y

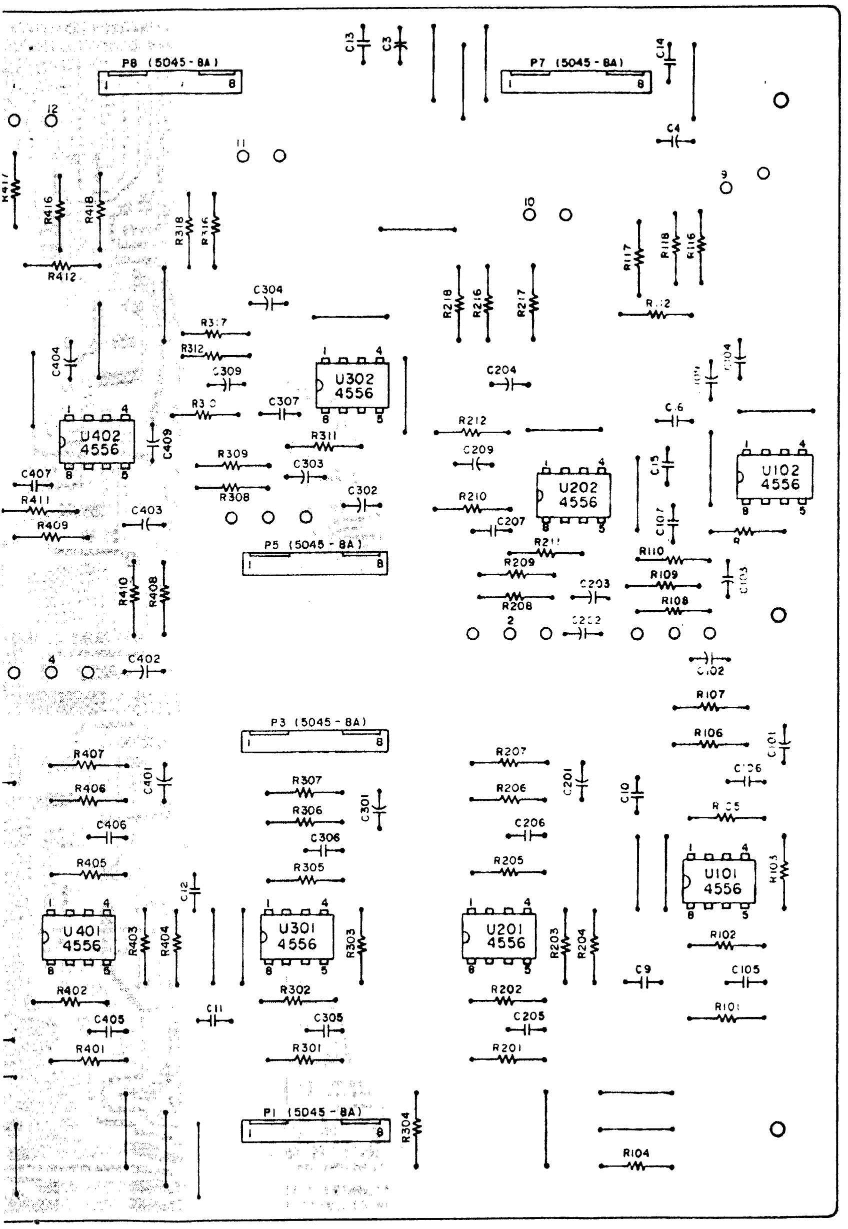
REF. NO.	PARTS NO.	DESCRIPTION
	*5200088400	PCB Ass'y
	5210084400	PCB
J1, J2	5330507200	Pin Jack, 4P (WHT)

3-5. BUSS AMPL. PCB Ass'y


P9 (5045-8A)
P8 (5045-8A)
P7 (5045-8A)
P6 (5045-8A)
P5 (5045-8A)
P4 (5045-8A)
P3 (5045-8A)
P2 (5045-8A)
P1 (5045-8A)
P12 (5045-3A)
P13 (5045-2A)
P14 (5045-3A)
P15 (5046-12A)
U101 4556
U102 4556
U201 4556
U202 4556
U301 4556
U302 4556
U401 4556
U402 4556
U501 4556
U502 4556
U601 4556
U602 4556
U701 4556
U702 4556
U801 4556
U802 4556
1 ch
2 ch
3 ch
4 ch
5 ch
6 ch
7 ch
8 ch
TEAC

BUSS AMPL. PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200086610	PCB Ass'y (M-512)
	*5200086620	PCB Ass'y (M-520)
	5210086600	PCB
		IC'S
U101, U201	5220414400	NJM4556D
U301, U401	5220414400	NJM4556D
U501, U601	5220414400	NJM4556D
U701, U801	5220414400	NJM4556D
U102, U202	5220414400	NJM4556D
U302, U402	5220414400	NJM4556D
U502, U602	5220414400	NJM4556D
U702, U802	5220414400	NJM4556D
		CARBON RESISTORS **All resistors are rated ± 5% tolerance at 1/4W.**
R101, R201	5181514000	22kΩ
R301, R401	5181514000	22kΩ
R501, R601	5181514000	22kΩ
R701, R801	5181514000	22kΩ
R102, R202	5181514000	22kΩ
R302, R402	5181514000	22kΩ
R502, R602	5181514000	22kΩ
R702, R802	5181514000	22kΩ
R103, R203	5181514000	22kΩ
R303, R403	5181514000	22kΩ
R503, R603	5181514000	22kΩ
R703, R803	5181514000	22kΩ
R104, R204	5181514000	22kΩ
R304, R404	5181514000	22kΩ
R504, R604	5181514000	22kΩ
R704, R804	5181514000	22kΩ
R105, R205	5181514000	22kΩ
R305, R405	5181514000	22kΩ
R505, R605	5181514000	22kΩ
R705, R805	5181514000	22kΩ
R106, R206	5181522000	47kΩ
R306, R406	5181522000	47kΩ
R506, R606	5181522000	47kΩ
R706, R806	5181522000	47kΩ
R107, R207	5181458000	100Ω
R307, R407	5181458000	100Ω
R507, R607	5181458000	100Ω
R707, R807	5181458000	100Ω
R108, R208	5181482000	1kΩ
R308, R408	5181482000	1kΩ
R508, R608	5181482000	1kΩ
R708, R808	5181482000	1kΩ
R109, R209	5181530000	100kΩ
R309, R409	5181530000	100kΩ
R509, R609	5181530000	100kΩ


P8 (5045-8A)
P7 (5045-8A)
P5 (5045-8A)
P3 (5045-8A)
P1 (5045-8A)
U302 4556
U402 4556
U202 4556
U102 4556
U401 4556
U301 4556
U201 4556
U101 4556
C304
C404
C309
C307
C409
C407
C403
C303
C302
C204
C209
C207
C203
C202
C402
C401
C406
C306
C301
C206
C201
C205
C305
C405
C12
C11
C9
C105
C106
C107
C101
C102
C104
C6
C4
C13
C14
C3
R416
R418
R412
R318
R316
R317
R312
R309
R308
R311
R411
R409
R410
R407
R406
R405
R402
R401
R403
R404
R307
R306
R305
R302
R301
R303
R304
R218
R216
R217
R212
R210
R211
R209
R208
R207
R206
R205
R202
R201
R203
R204
R117
R118
R116
R112
R110
R109
R108
R107
R106
R105
R104
R103
R102
R101

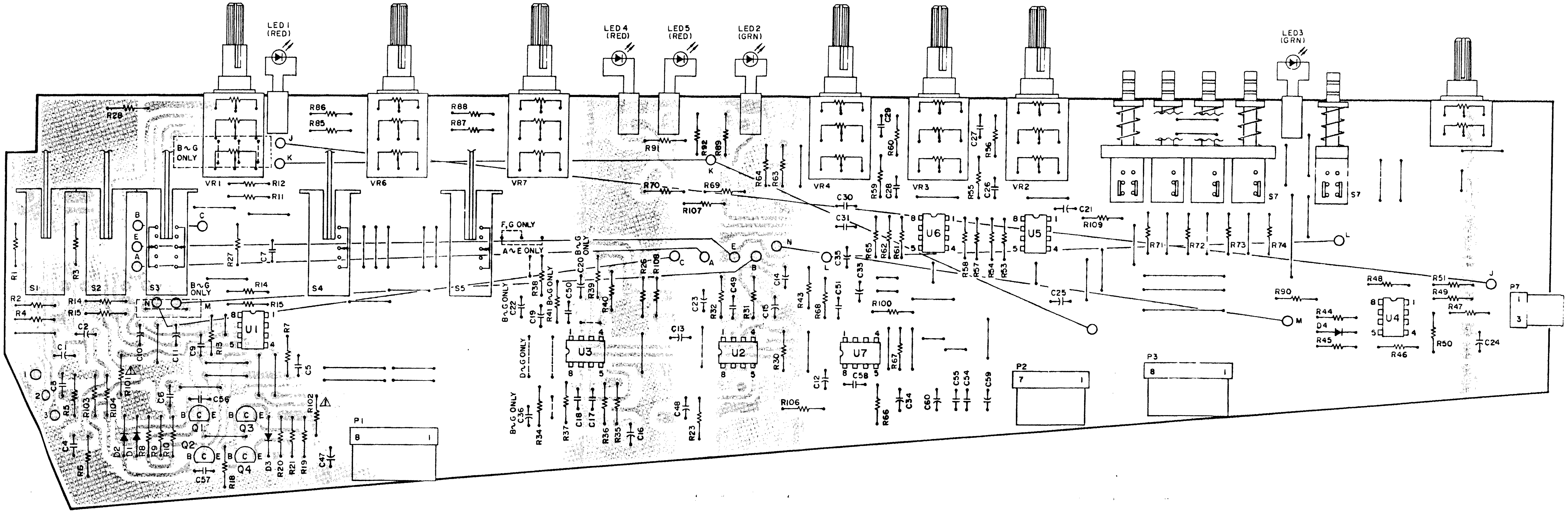
BUSS AMPL. PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200086610	PCB Ass'y (M-512)
	*5200086620	PCB Ass'y (M-520)
	5210086600	PCB
		IC'S
U101, U201	5220414400	NJM4556D
U301, U401	5220414400	NJM4556D
U501, U601	5220414400	NJM4556D
U701, U801	5220414400	NJM4556D
U102, U202	5220414400	NJM4556D
U302, U402	5220414400	NJM4556D
U502, U602	5220414400	NJM4556D
U702, U802	5220414400	NJM4556D
		CARBON RESISTORS **All resistors are rated ± 5% tolerance at 1/4W.**
R101, R201	5181514000	22kΩ
R301, R401	5181514000	22kΩ
R501, R601	5181514000	22kΩ
R701, R801	5181514000	22kΩ
R102, R202	5181514000	22kΩ
R302, R402	5181514000	22kΩ
R502, R602	5181514000	22kΩ
R702, R802	5181514000	22kΩ
R103, R203	5181514000	22kΩ
R303, R403	5181514000	22kΩ
R503, R603	5181514000	22kΩ
R703, R803	5181514000	22kΩ
R104, R204	5181514000	22kΩ
R304, R404	5181514000	22kΩ
R504, R604	5181514000	22kΩ
R704, R804	5181514000	22kΩ
R105, R205	5181514000	22kΩ
R305, R405	5181514000	22kΩ
R505, R605	5181514000	22kΩ
R705, R805	5181514000	22kΩ
R106, R206	5181522000	47kΩ
R306, R406	5181522000	47kΩ
R506, R606	5181522000	47kΩ
R706, R806	5181522000	47kΩ
R107, R207	5181458000	100Ω
R307, R407	5181458000	100Ω
R507, R607	5181458000	100Ω
R707, R807	5181458000	100Ω
R108, R208	5181482000	1kΩ
R308, R408	5181482000	1kΩ
R508, R608	5181482000	1kΩ
R708, R808	5181482000	1kΩ
R109, R209	5181530000	100kΩ
R309, R409	5181530000	100kΩ
R509, R609	5181530000	100kΩ

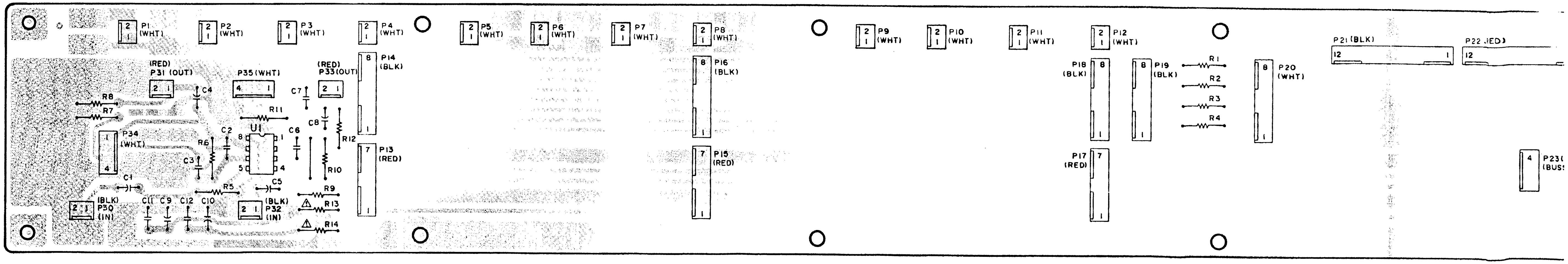
REF. NO.	PARTS NO.	DESCRIPTION
R709, R809	5181530000	100kΩ
R110, R210	5181506000	10kΩ
R310, R410	5181506000	10kΩ
R510, R610	5181506000	10kΩ
R710, R810	5181506000	10kΩ
R111, R211	5181510000	15kΩ
R311, R411	5181510000	15kΩ
R511, R611	5181510000	15kΩ
R711, R811	5181510000	15kΩ
R112, R212	5181530000	100kΩ
R312, R412	5181530000	100kΩ
R512, R612	5181530000	100kΩ
R712, R812	5181530000	100kΩ
R116, R216	5181458000	100Ω
R316, R416	5181458000	100Ω
R516, R616	5181458000	100Ω
R716, R816	5181458000	100Ω
R117, R217	5181522000	47kΩ
R317, R417	5181522000	47kΩ
R517, R617	5181522000	47kΩ
R717, R817	5181522000	47kΩ
R118, R218	5181434000	10Ω
R318, R418	5181434000	10Ω
R518, R618	5181434000	10Ω
R718, R818	5181434000	10Ω

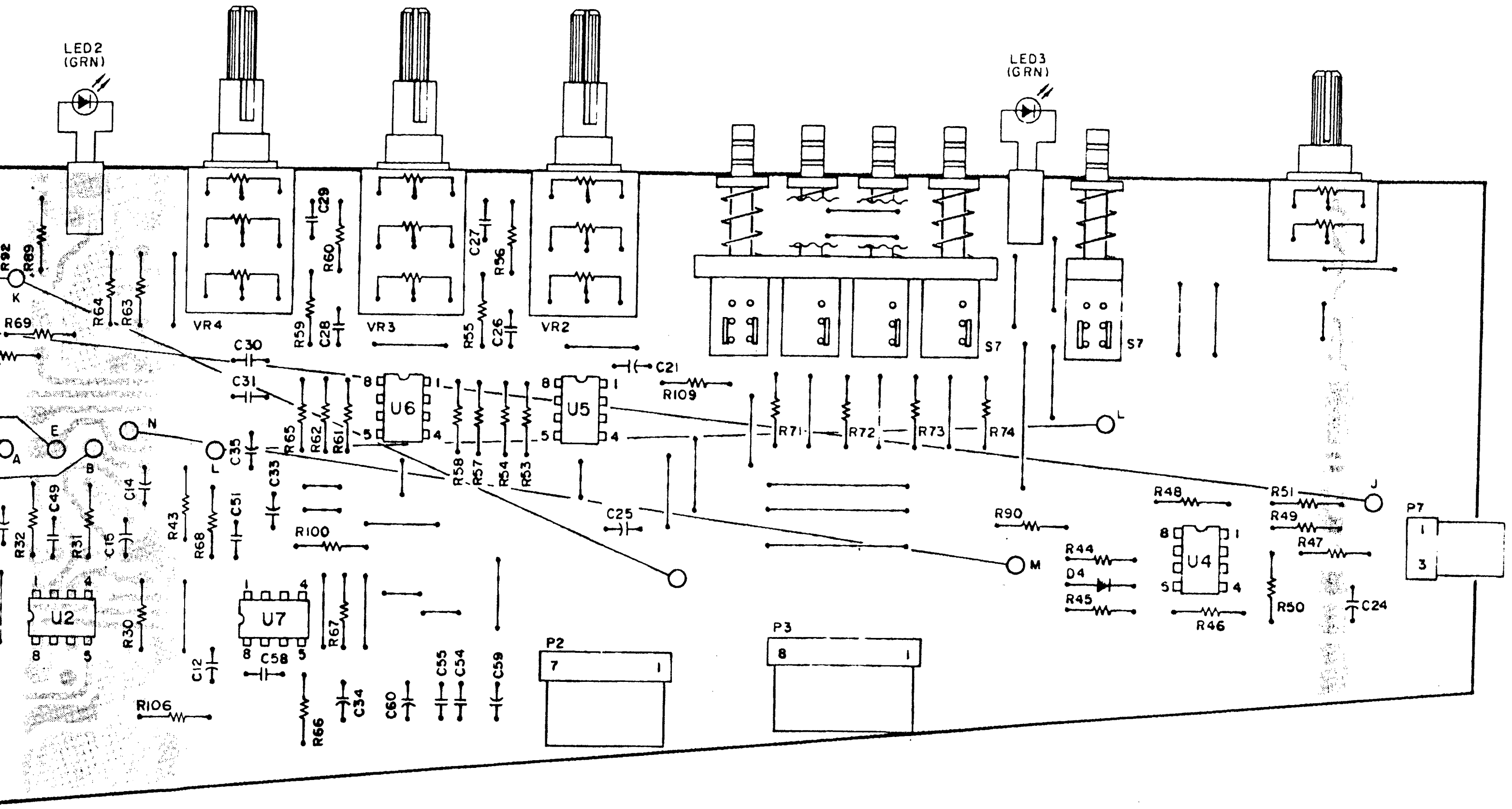
REF. NO.	PARTS NO.	DESCRIPTION		
		CAPACITORS		
C1 ~ C6	5260165252	Elec.	47μF	25V
C7 ~ C22	5173433000	Ceramic	0.01μF	50V
C101, C201	5260163452	Elec.	22μF	25V
C301, C401	5260163452	Elec.	22μF	25V
C501, C601	5260163452	Elec.	22μF	25V
C701, C801	5260163452	Elec.	22μF	25V
C102, C202	5260162550	Elec.	10μF	16V
C302, C402	5260162550	Elec.	10μF	16V
C502, C602	5260162550	Elec.	10μF	16V
C702, C802	5260162550	Elec.	10μF	16V
C103, C203	5260162550	Elec.	10μF	16V
C303, C403	5260162550	Elec.	10μF	16V
C503, C603	5260162550	Elec.	10μF	16V
C703, C803	5260162550	Elec.	10μF	16V
C104, C204	5260163452	Elec.	22μF	25V
C304, C404	5260163452	Elec.	22μF	25V
C504, C604	5260163452	Elec.	22μF	25V
C704, C804	5260163452	Elec.	22μF	25V
C105, C205	5172208000	Ceramic	47pF	
C305, C405	5172208000	Ceramic	47pF	
C505, C605	5172208000	Ceramic	47pF	
C705, C805	5172208000	Ceramic	47pF	
C106, C206	5172204000	Ceramic	22pF	
C306, C406	5172204000	Ceramic	22pF	
C506, C606	5172204000	Ceramic	22pF	
C706, C806	5172204000	Ceramic	22pF	
C107, C207	5172211000	Ceramic	82pF	
C307, C407	5172211000	Ceramic	82pF	
C507, C607	5172211000	Ceramic	82pF	
C707, C807	5172211000	Ceramic	82pF	
C109, C209	5260163452	Elec.	22μF	25V
C309, C409	5260163452	Elec.	22μF	25V
C509, C609	5260163452	Elec.	22μF	25V
C709, C809	5260163452	Elec.	22μF	25V
		CONNECTOR PLUGS		
P1 ~ P9	5122132000	8P (WHT)		
P12	5122127000	3P (WHT)		
P13	5122126000	2P (WHT)		
P14	5122127000	3P (WHT)		
P15, P16	5122155000	12P (WHT)		

3-6. INPUT AMPL.PCB (A ~ G) Ass'y


LED1 (RED)
LED4 (RED)
LED5 (RED)
LED2 (GRN)
LED3 (GRN)
VR1
VR6
VR7
VR4
VR3
VR2
B~G ONLY
F,G ONLY
A~E ONLY
D~G ONLY
S1
S2
S3
S4
S5
S7
U1
U2
U3
U4
U5
U6
U7
Q1
Q2
Q3
Q4
D1
D2
D3
D4
P1
P2
P3
P7

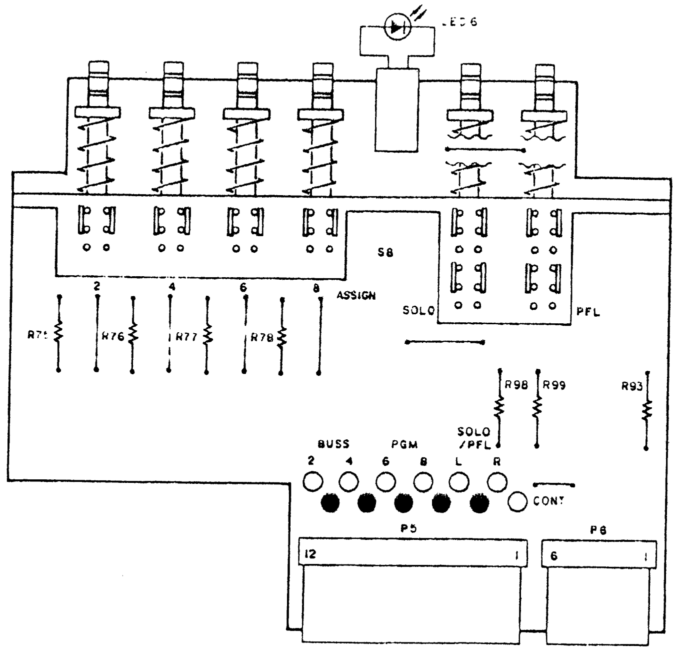
3-7. MOTHER B PCB Ass'y [M-512]


P1 (WHT)
P2 (WHT)
P3 (WHT)
P4 (WHT)
P5 (WHT)
P6 (WHT)
P7 (WHT)
P8 (WHT)
P9 (WHT)
P10 (WHT)
P11 (WHT)
P12 (WHT)
P13 (RED)
P14 (BLK)
P15 (RED)
P16 (BLK)
P17 (RED)
P18 (BLK)
P19 (BLK)
P20 (WHT)
P21 (BLK)
P22 (RED)
P23 (BUS
(RED) P31 (OUT)
(RED) P33 (OUT)
P34 (WHT)
P35 (WHT)
(BLK) P30 (IN)
(BLK) P32 (IN)
U1



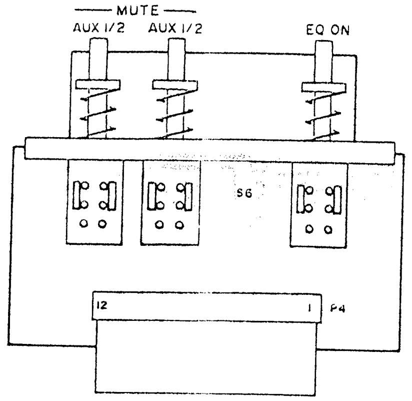
LED2 (GRN)
LED3 (GRN)
VR4
VR3
VR2
U6
U5
U2
U7
U4
S7
S7
D4
P2
P3
P7
R92
R89
R69
R64
R63
R60
R59
R56
R55
R65
R62
R61
R58
R57
R54
R53
R71
R72
R73
R74
R109
R90
R48
R51
R49
R47
R44
R45
R46
R50
R43
R68
R100
R32
R31
R30
R67
R66
R106
C29
C28
C27
C26
C30
C31
C21
C25
C35
C33
C49
C15
C14
C51
C12
C58
C34
C60
C55
C54
C59
C24
K
A
E
B
N
L
L
J
M

3-6-1. SW B PCB

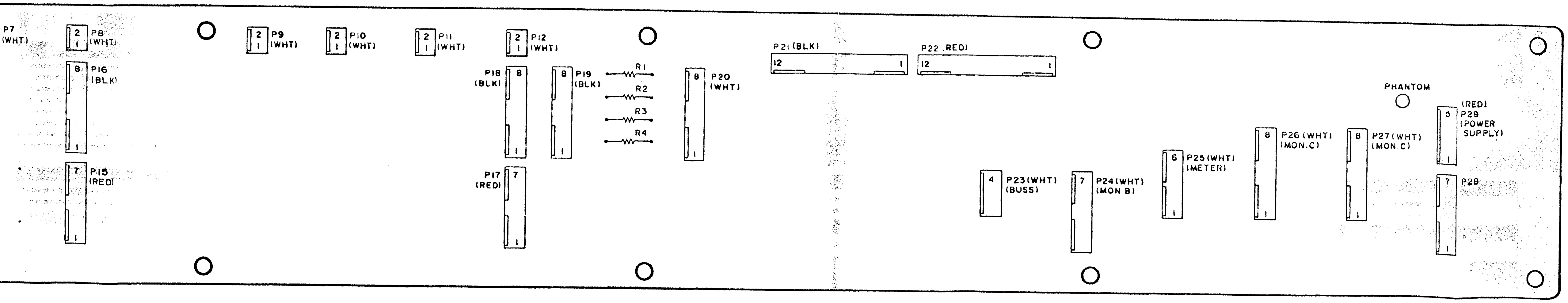


LED6
S8
ASSIGN
SOLO
PFL
R75
R76
R77
R78
R98
R99
R93
BUSS
PGM
SOLO /PFL
2
4
6
8
L
R
CONT
P5
P6
12
1
6
1

3-6-2. SW A PCB



MUTE
AUX 1/2
AUX 1/2
EQ ON
S6
12
1
P4



P7 (WHT)
P8 (WHT)
P16 (BLK)
P15 (RED)
P9 (WHT)
P10 (WHT)
P11 (WHT)
P12 (WHT)
P18 (BLK)
P19 (BLK)
P17 (RED)
R1
R2
R3
R4
P20 (WHT)
P21 (BLK)
P22 (RED)
PHANTOM
P23 (WHT) (BUSS)
P24 (WHT) (MON.B)
P25 (WHT) (METER)
P26 (WHT) (MON.C)
P27 (WHT) (MON.C)
(RED) P29 (POWER SUPPLY)
P28

INPUT AMPL. PCB (A ~ G) ASS'Y (Included SW A PCB and SW B PCB.)

REF. NO.	PARTS NO.	DESCRIPTION
	*5200133000	PCB A Ass'y (Chan. 1, 2)
	*5200133010	PCB B Ass'y (Chan. 3)
	*5200133020	PCB C Ass'y (Chan. 4)
	*5200133030	PCB D Ass'y (M-512: Chan. 5 ~ 7) (M-520: Chan. 5 ~ 11, 13 ~ 15)
	*5200133040	PCB E Ass'y (M-512: Chan. 8) (M-520: Chan. 8, 12, 16)
	*5200133050	PCB F Ass'y (M-512: Chan. 9 ~ 11) (M-520: Chan. 17 ~ 19)
	*5200133060	PCB G Ass'y (M-512: Chan. 12) (M-520: Chan. 20)
	5210133000	PCB
		IC's
U1	5220407000	TL072CP
U2	5220414400	NJM4556D
U3	5220416600	NJM2041DD (All except A)
U4	6048650003	NJM2903D
U5, U6	5220407000	TL072CP
U7	5220414400	NJM4556D
		TRANSISTORS
Q1, Q2	5145119000	2SC1844F
Q3, Q4	5145151000	2SC1815GR
		DIODES
D1 ~ D4	5143118000	1S2473HJ
		CARBON RESISTORS **All resistors are rated ±5% tolerance and 1/4 watt, unless otherwise noted.**
R1	5181482000	1kΩ
R2	5181454000	68Ω
R3	5181482000	1kΩ
R4	5181491000	2.4kΩ
R5, 6	5181506000	10kΩ
R7	5241152200	47kΩ 1% Metal Film
R8, R9	5241149800	4.7kΩ 1% Metal Film
R10	5181458000	100Ω
R11	5181448000	39Ω
R12	5181546000	470kΩ
R13	5241152200	47kΩ 1% Metal Film
R14, R15	5241150600	10kΩ 1% Metal Film
R16, R17	5181530000	100kΩ
R18	5181500000	5.6kΩ
R19	5241148600	1.5kΩ 1% Metal Film
R20	5181486000	1.5kΩ
R21	5241148600	1.5kΩ 1% Metal Film
R23	5181522000	47kΩ
R26	5181522000	47kΩ
R27	5181530000	100kΩ

REF. NO.	PARTS NO.	DESCRIPTION
R28	5181462000	150Ω
R30	5181530000	100kΩ
R31	5181506000	10kΩ
R32	5181510000	15kΩ
R34	5181522000	47kΩ (B, C)
R35	5181498000	4.7kΩ (B, C)
R36	5181522000	47kΩ (B, C)
R37	5181548000	560kΩ (B, C)
R38	5181482000	1kΩ (B, C)
R39	5181530000	100kΩ (All except A)
R40	5181482000	1kΩ (B, C)
R41	5181506000	10kΩ (B, C)
R43	5181458000	100Ω
R44	5181530000	100kΩ
R45	5181515000	24kΩ
R46	5181516000	27kΩ
R47	5181530000	100kΩ
R48	5181458000	100Ω
R49	5181516000	27kΩ
R50	5181522000	47kΩ
R51	5181476000	560Ω
R52	5181538000	220kΩ
R53 ~ R58	5181506000	10kΩ
R59, R60	5181488000	1.8kΩ
R61, R62	5181506000	10kΩ
R63, R64	5181513000	20kΩ
R65 ~ R67	5181506000	10kΩ
R68	5181510000	15kΩ
R69	5181522000	47kΩ
R70	5181458000	100Ω
R71 ~ R74	5181514000	22kΩ
R85 ~ R88	5181514000	22kΩ
R89 ~ R92	5181476000	560Ω
R100	5181530000	100kΩ
R101, R102	⚠ 5183566000	33Ω Nonflammable
R103, R104	5181434000	10Ω
R105 ~ R106	5181522000	47kΩ
R107, R108	5181434000	10Ω
R109	5181522000	47kΩ
VR9	5240030620	10kΩ 1/8W

REF. NO.	PARTS NO.	DESCRIPTION			
		CAPACITORS			
C1, C2	5260223210	Elec.	22μF	50V	
C3, C4	5054744000	Dip Mica	100pF		
C5	5170006000	Dip Mica	68pF		
C6	5170352000	Mylar	0.001μF		
C7	5260072700	Elec. (B.P.)	470μF	16V	
C9	5170006000	Dip, Mica	68pF		
C10, C11	5260165252	Elec.	47μF	25V	
C12, C13	5260163452	Elec.	22μF	25V	
C14	5260162550	Elec.	10μF	16V	
C15	5260165252	Elec.	47μF	25V	
C16	5260165952	Elec.	100μF	10V	(B, C)
C17	5170356000	Mylar	0.0015μF		(B, C)
C18	5170368000	Mylar	0.0047μF		(B, C)
C19	5260163452	Elec.	22μF	25V	(B, C)
C20	5260162550	Elec.	10μF	16V	
			(All except A)		
C21	5260163452	Elec.	22μF	25V	
C22	5260163452	Elec.	22μF	25V	
			(All except A)		
C23	5260163452	Elec.	22μF	25V	
C24	5260160750	Elec.	1μF	50V	
C25	5260162550	Elec.	10μF	16V	
C26	5171872000	Mylar	0.047μF		
C27	5171862000	Mylar	0.018μF		
C28	5171866000	Mylar	0.027μF		
C29	5171856000	Mylar	0.01μF		
C30	5172827000	Polist.	910pF		
C31	5172816000	Polist.	330pF		
C33, C34	5260162550	Elec.	10μF	16V	
C35	5260163452	Elec.	22μF	25V	
C36	5260162550	Elec.	10μF	16V	(B, C)
C46, C47	5260166052	Elec.	100μF	16V	
C48	5260162550	Elec.	10μF	16V	
C49	5054758000	Dip Mica	82pF		
C50	5054758000	Dip Mica	82pF		(B, C)
C51	5054758000	Dip Mica	82pF		
C54, C55	5054204000	Ceramic	0.01μF	50V	
C56 ~ C58	5054742000	Dip Mica	47pF		
C59, C60	5260165252	Elec.	47μF	25V	
C61	5054204000	Ceramic	0.01μF	50V	
		SWITCHES			
S1, S2	5132037000	Lever, SLR522			
S3 ~ S5	5132036000	Lever, SLR523			
S7	5300029800	Push, SUJ50			
		VARIABLE RESISTORS			
VR1	5283504900	5kΩ (RD) + 10kΩ (RD) + 10kΩ (A) [Chan. 1, 2]			
	5282706700	5kΩ (RD) + 10kΩ (A) [Chan. 3 ~ 20]			
VR2 ~ VR4	5283505000	10kΩ (B) + 100kΩ (E) x 2			
VR6, VR7	5282707300	20kΩ (A) x 2			
VR8	5282408600	5kΩ (A, C)			

REF. NO.	PARTS NO.	DESCRIPTION
		LED's
D1	5225006900	PR3432S (RED)
D2	5224015800	PG3432SY (GRN)
D3	5224015800	PR3432SY (GRN)
D4	5225006900	PG3432S (RED)
D5	5225006900	PR3432S (RED)
		CONNECTORS
P1	5122151000	Plug 8P (WHT)
P2	5122150000	Plug 7P (WHT)
P3	5122151000	Plug 8P (WHT)
P7	5122146000	Plug 3P (WHT)
	5122373000	Socket 2P (WHT)
		Sub PCBs
	5210086301	PCB, SW (A)
S6	5300029400	Push Switch, SUJ-30
P4	5122155000	Connector Plug, 12P (WHT)
	5210086401	PCB, SW (B)
R75 ~ R80	5181514000	Carbon Resistor, 22kΩ, 1/4W 5%
R93	5181476000	Carbon Resistor, 560Ω, 1/4W 5%
R98, R99	5181514000	Carbon Resistor, 22kΩ, 1/4W 5%
S8	5300029700	Switch, Push, SUJ60
D6	5225006900	LED PR3432S
P5	5122155000	Connector Plug 12P (WHT)
P6	5122149000	Connector Plug 6P (WHT)
	5122373000	Connector socket, 2P

Components Mounted Chart

○ : Mounted
– : Not Mounted

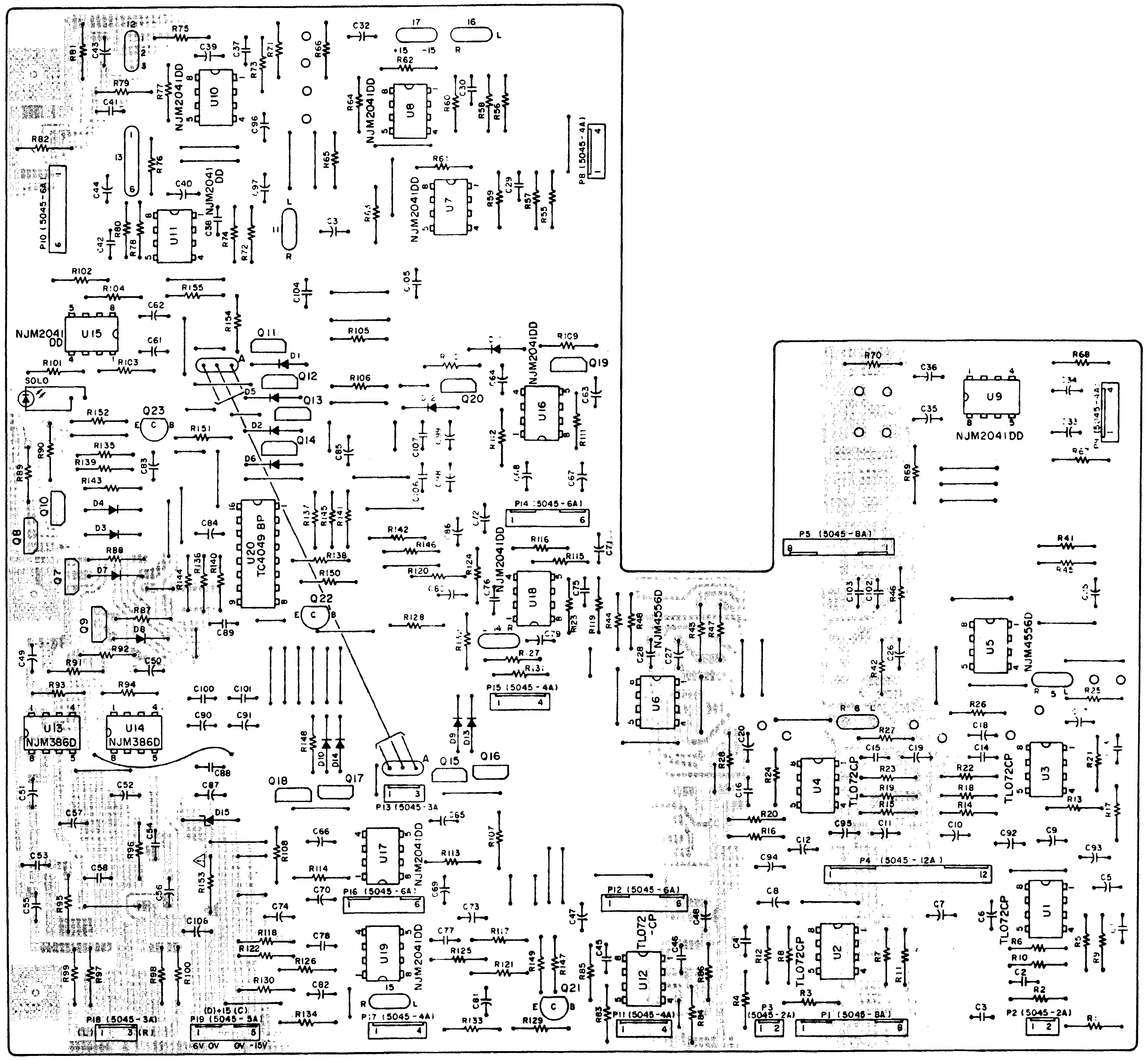
PCB Ass'y		A	B	C	D	E	F	G
CHANNEL	M-512	1, 2	3	4	5 ~ 7	8	9 ~ 11	12
	M-520	1, 2	3	A	5 ~ 11, 13 ~ 15	8, 12, 16	17 ~ 19	20
REF. NO.	U3	–	○	○	○	○	○	○
	R34	–	○	○	–	–	–	–
	R35	–	○	○	–	–	–	–
	R36	–	○	○	–	–	–	–
	R37	–	○	○	–	–	–	–
	R38	–	○	○	–	–	–	–
	R39	–	○	○	○	○	○	○
	R40	–	○	○	–	–	–	–
	R41	–	○	○	0Ω	0Ω	0Ω	0Ω
	C16	–	○	○	–	–	–	–
	C17	–	○	○	–	–	–	–
	C18	–	○	○	–	–	–	–
	C19	–	○	○	–	–	–	–
	C20	–	○	○	○	○	○	○
	C22	–	○	○	○	○	○	○
	C36	–	○	○	0Ω	0Ω	0Ω	0Ω
	C50	–	○	○	–	–	–	–

MOTHER B PCB Ass'y [M-512]

REF. NO.	PARTS NO.	DESCRIPTION		
	* 5200088102	PCB Ass'y		
	5210088101	PCB		
		IC		
U1	5220416600	NJM2041DD		
		CARBON RESISTORS		
		All resistors are rated ±5% tolerance at 1/4W.		
R1 ~ R4	5181514000	22kΩ		
R5	5181538000	220kΩ		
R6	5181554000	1MΩ		
R7	5181458000	100Ω		
R8	5181522000	47kΩ		
R9	5181538000	220kΩ		
R10	5181554000	1MΩ		
R11	5181458000	100Ω		
R12	5181522000	47kΩ		
R13, R14	⚠ 5183566000	33Ω		Nonflammable

REF. NO.	PARTS NO.	DESCRIPTION			
		CAPACITORS			
C1	5260162550	Elec.	10μF	16V	
C2	5172212000	Ceramic	100pF		
C3	5260069650	Elec.	47μF	16V	(B.P.)
C4	5260163452	Elec.	22μF	25V	
C5	5260162550	Elec.	10μF	16V	
C6	5172212000	Ceramic	100pF		
C7	5260069650	Elec.	47μF	16V	(B.P.)
C8	5260163452	Elec.	22μF	25V	
C9, C10	5260165252	Elec.	47μF	25V	
C11, C12	5173433000	Ceramic	0.01μF	50V	
		CONNECTOR PLUGS			
P1 ~ P12	5122126000	2P (WHT)			
P13	5122304000	7P (RED)			
P14	5122189000	8P (BLK)			
P15	5122304000	7P (RED)			
P16	5122189000	8P (BLK)			
P17	5122304000	7P (RED)			
P18, P19	5122189000	8P (BLK)			
P20	5122132000	8P (WHT)			
P21	5122193000	12P (BLK)			
P22	5122309000	12P (RED)			
P23	5122128000	4P (WHT)			
P24	5122131000	7P (BLK)			
P25	5122130000	6P (WHT)			
P26, P27	5122189000	8P (BLK)			
P28	5122304000	7P (RED)			
P29	5122302000	5P (RED)			
P30	5122183000	2P (BLK)			
P31	5122299000	2P (RED)			
P32	5122183000	2P (BLK)			
P33	5122299000	2P (RED)			
P34, P35	5122128000	4P (WHT)			

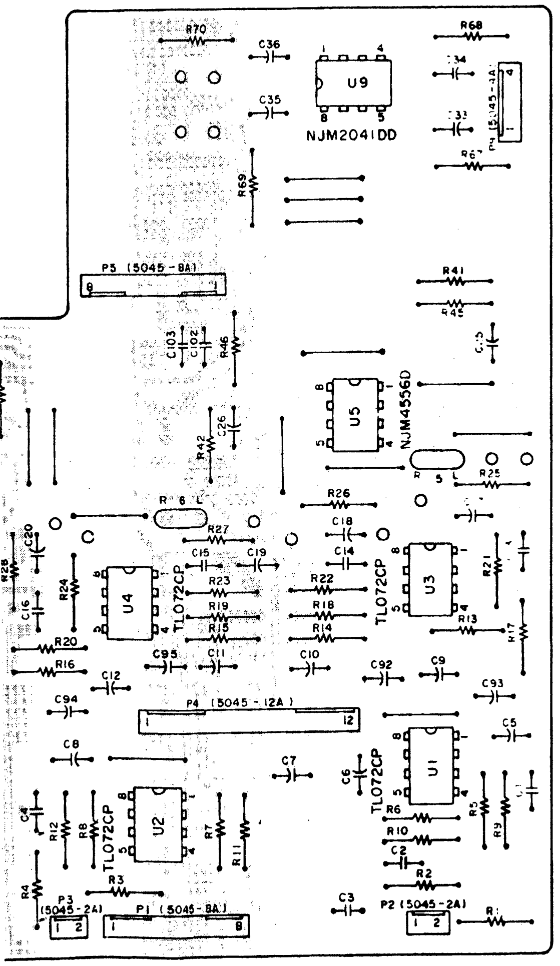
3-8. MONITOR AMPL. B PCB Ass'y


U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
U12
U13
U14
U15
U16
U17
U18
U19
U20
TC4049 BP
NJM2041DD
NJM4556D
TL072CP
NJM386D
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
SOLO
P1 (5045-8A)
P2 (5045-2A)
P3 (5045-2A)
P4 (5045-12A)
P5 (5045-8A)
P8 (5045-4A)
P10 (5045-6A)
P11 (5045-4A)
P12 (5045-6A)
P13 (5045-3A)
P14 (5045-6A)
P15 (5045-4A)
P16 (5045-6A)
P17 (5045-4A)
P18 (5045-3A)
P19 (5045-5A)
(D) +15 (C)
6V 0V 0V -15V
L R
+15 -15

MONITOR AMPL. B PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200086910	PCB Ass'y (M-512)
	*5200086920	PCB Ass'y (M-520)
	5210086901	PCB
		IC'S
U1 ~ U4	5220407000	TL072CP
U5, U6	5220414400	NJM4556D
U7 ~ U11	5220416600	NJM2041DD
U12	5220407000	TL072CP
U13, U14	6048649000	NJM386D
U15 ~ 17	5220416600	NJM2041DD
U18, U19	5220416600	NJM2041DD
U20	5220020000	TC4049BP
		TRANSISTORS
Q7 ~ Q20	5232007000	2SK-304 (EF)
Q21 ~ Q23	5145151000	2SC-1815GR
		DIODES
D1 ~ D14	5143118000	1S2473HJ
D15	5042281000	WZ120, Zener
		RESISTORS All resistors are rated ± 5% tolerance 1/4 watt and of carbon type unless otherwise noted.
R1 ~ R4	5181514000	22kΩ
R5 ~ R8	5181538000	220kΩ
R9 ~ R12	5181514000	22kΩ
R13 ~ R16	5181522000	47kΩ
R17 ~ R24	5181532000	120kΩ
R25 ~ R28	5181522000	47kΩ
R41 ~ R44	5181522000	47kΩ
R45 ~ R48	5181458000	100Ω
R55, R56	5181514000	22kΩ
R57, R58	5181538000	220kΩ
R59 ~ R64	5181514000	22kΩ
R65, R66	5181522000	47kΩ
R67, R68	5181530000	100kΩ
R69, R70	5181522000	47kΩ
R71, R72	5181538000	220kΩ
R73, R74	5181514000	22kΩ
R75 ~ R78	5181522000	47kΩ
R79, R80	5181514000	22kΩ
R81, R82	5181522000	47kΩ
R83, R84	5181538000	220kΩ
R85, R86	5181502000	6.8kΩ
R87 ~ R90	5181482000	1kΩ
R91, R92	5181522000	47kΩ
R93, R94	5181530000	100kΩ
R95, R96	5181434000	10Ω

REF. NO.	
R97, R98	
R99, R100	
R101, R102	
R103, R104	
R105, R106	
R107, R108	
R109, R110	
R111, R112	
R113, R114	
R115 ~ R118	
R119 ~ R122	
R123 ~ R126	
R127 ~ R130	
R131 ~ R134	
R135 ~ R138	
R139 ~ R148	
R149	
R150	
R151	
R152	
R153	
R154, R155	
C1 ~ C4	
C5 ~ C8	
C9 ~ C12	
C13 ~ C16	
C17 ~ C20	
C25 ~ C28	
C29, C30	
C31, C32	
C33, C34	
C35, C36	
C37, C38	
C39, C40	
C41, C42	5
C43, C44	5
C45, C46	5
C47, C48	5
C49 ~ C52	5
C53, C54	5
C55, C56	5
C57	5
C58	5
C61, C62	5
C63 ~ C66	5
C67 ~ C70	5
C71 ~ C74	5
C75 ~ C78	5
C79 ~ C82	5
C83	5
C84	5
C85, C86	5



MONITOR AMPL. B PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200086910	PCB Ass'y (M-512)
	*5200086920	PCB Ass'y (M-520)
	5210086901	PCB

IC'S

REF. NO.	PARTS NO.	DESCRIPTION
U1 ~ U4	5220407000	TL072CP
U5, U6	5220414400	NJM4556D
U7 ~ U11	5220416600	NJM2041DD
U12	5220407000	TL072CP
U13, U14	6048649000	NJM386D
U15 ~ 17	5220416600	NJM2041DD
U18, U19	5220416600	NJM2041DD
U20	5220020000	TC4049BP

TRANSISTORS

REF. NO.	PARTS NO.	DESCRIPTION
Q7 ~ Q20	5232007000	2SK-304 (EF)
Q21 ~ Q23	5145151000	2SC-1815GR

DIODES

REF. NO.	PARTS NO.	DESCRIPTION
D1 ~ D14	5143118000	1S2473HJ
D15	5042281000	WZ120, Zener

RESISTORS

All resistors are rated ±5% tolerance 1/4 watt and of carbon type unless otherwise noted.

REF. NO.	PARTS NO.	DESCRIPTION	
R1 ~ R4	5181514000	22kΩ	
R5 ~ R8	5181538000	220kΩ	
R9 ~ R12	5181514000	22kΩ	
R13 ~ R16	5181522000	47kΩ	
R17 ~ R24	5181532000	120kΩ	
R25 ~ R28	5181522000	47kΩ	
R41 ~ R44	5181522000	47kΩ	
R45 ~ R48	5181458000	100Ω	
R55, R56	5181514000	22kΩ	
R57, R58	5181538000	220kΩ	
R59 ~ R64	5181514000	22kΩ	
R65, R66	5181522000	47kΩ	
R67, R68	5181530000	100kΩ	
R69, R70	5181522000	47kΩ	
R71, R72	5181538000	220kΩ	
R73, R74	5181514000	22kΩ	
R75 ~ R78	5181522000	47kΩ	
R79, R80	5181514000	22kΩ	
R81, R82	5181522000	47kΩ	
R83, R84	5181538000	220kΩ	
R85, R86	5181502000	6.8kΩ	
R87 ~ R90	5181482000	1kΩ	
R91, R92	5181522000	47kΩ	
R93, R94	5181530000	100kΩ	
R95, R96	5181434000	10Ω	
R97, R98	5181482000	1kΩ	
R99, R100	5181410000	1Ω	
R101, R102	5181524000	56kΩ	
R103, R104	5181514000	22kΩ	
R105, R106	5181506000	10kΩ	
R107, R108	5181518000	33kΩ	
R109, R110	5181542000	330kΩ	
R111, R112	5181528000	82kΩ	
R113, R114	5181540000	270kΩ	
R115 ~ R118	5181530000	100kΩ	
R119 ~ R122	5181506000	10kΩ	
R123 ~ R126	5181510000	15kΩ	
R127 ~ R130	5181522000	47kΩ	
R131 ~ R134	5181458000	100Ω	
R135 ~ R138	5181526000	68kΩ	
R139 ~ R148	5181530000	100kΩ	
R149	5181494000	3.3kΩ	
R150	5181506000	10kΩ	
R151	5181516000	27kΩ	
R152	5180066000	220Ω	1/2W
R153	† 5183590000	330Ω	Nonflammable
R154, R155	5181522000	47kΩ	

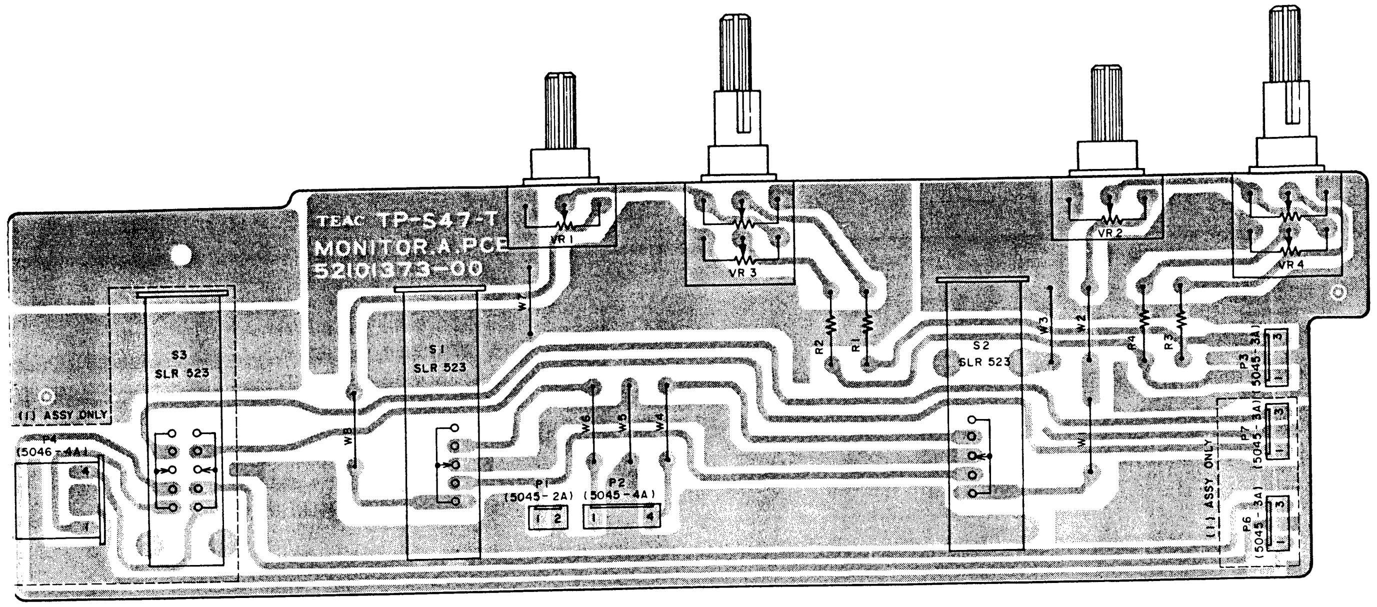
CAPACITORS

REF. NO.	PARTS NO.	DESCRIPTION		
C1 ~ C4	5054382000	Dip Mica	22pF	
C5 ~ C8	5260163452	Elec.	22μF	25V
C9 ~ C12	5260162550	Elec.	10μF	16V
C13 ~ C16	5054740000	Dip Mica	10pF	
C17 ~ C20	5260163452	Elec.	22μF	25V
C25 ~ C28	5260163452	Elec.	22μF	25V
C29, C30	5054382000	Dip Mica	22pF	
C31, C32	5260163452	Elec.	22μF	25V
C33, C34	5260162550	Elec.	10μF	16V
C35, C36	5260163452	Elec.	22μF	25V
C37, C38	5054382000	Dip Mica	22pF	
C39, C40	5260163452	Elec.	22μF	25V
C41, C42	5054382000	Dip Mica	22pF	
C43, C44	5260163452	Elec.	22μF	25V
C45, C46	5054382000	Dip Mica	22pF	
C47, C48	5260163452	Elec.	22μF	25V
C49 ~ C52	5260162550	Elec.	10μF	16V
C53, C54	5054738500	Mylar	0.047μF	
C55, C56	5173079000	Elec.	1000μF	6.3V
C57	5173080000	Elec.	1000μF	10V
C58	5054204000	Ceramic	0.01μF	50V
C61, C62	5260163452	Elec.	22μF	25V
C63 ~ C66	5260162550	Elec.	10μF	16V
C67 ~ C70	5260163452	Elec.	22μF	25V
C71 ~ C74	5260162550	Elec.	10μF	16V
C75 ~ C78	5054758000	Dip Mica	82pF	
C79 ~ C82	5260163452	Dip Mica	22pF	25V
C83	5260160750	Elec.	1μF	16V
C84	5260160750	Elec.	1μF	50V
C85, C86	5260160750	Elec.	1μF	50V
C87	5260165252	Elec.	47μF	25V
C88, C89	5054204000	Ceramic	0.01μF	50V
C90 ~ C99	5260165252	Elec.	47μF	25V
C100 ~ C107	5054204000	Ceramic	0.01μF	50V
C108	5260165052	Elec.	47μF	10V

CONNECTOR PLUGS

REF. NO.	PARTS NO.	DESCRIPTION
P1	5122132000	8P (WHT)
P2, P3	5122126000	2P (WHT)
P4	5122136000	12P (WHT)
P5	5122132000	8P (WHT)
P8, P9	5122128000	4P (WHT)
P10	5122130000	6P (WHT)
P11	5122128000	4P (WHT)
P12	5122130000	6P (WHT)
P13	5122127000	3P (WHT)
P14	5122130000	6P (WHT)
P15	5122128000	4P (WHT)
P16	5122130000	6P (WHT)
P17	5122128000	4P (WHT)
P18	5122127000	3P (WHT)
P19	5122129000	5P (WHT)

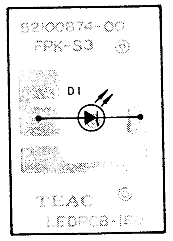
3-9. MONITOR A PCB (1, 2) Ass'y [M-520]


TEAC TP-S47-T
MONITOR A PCB
5210137300
VR 1
VR 3
VR 2
VR 4
S3
SLR 523
S1
SLR 523
S2
SLR 523
R2
R1
R3
R4
W1
W2
W3
W4
W5
W6
W7
W8
P1
P2
(5045-2A)
(5045-4A)
P3
P4
P6
(1) ASSY ONLY
(5046-4A)

MONITOR A PCB (1, 2) Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	* 5200137300	PCB 1 Ass'y
	* 5200137310	PCB 2 Ass'y
	5210137300	PCB
R1 ~ R4	5181514000	Carbon Resistor, 22 kΩ 1/4W 5%
S1, S2	5132036000	Lever Switch, SLR523
S3	5132036000	Lever Switch, SLR523 [1 only]
VR1, VR2	5282011500	Variable Resistor, 10 kΩ (A)
VR3, VR4	5282408600	Variable Resistor, 5 kΩ (A, C)
P1	5122126000	Connector Plug 2P (WHT)
P2	5122185000	Connector Plug 4P (BLK)
P3	5122127000	Connector Plug 3P (WHT)
P4	5122147000	Connector Plug 4P (WHT) [1 only]
P6	5336107300	Connector Plug 3P (YEL) [1 only]
P7	5122184000	Connector Plug 3P (BLK) [1 only]

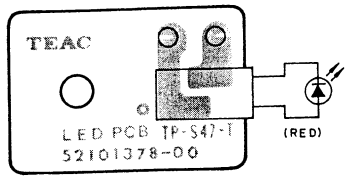
3-10. LED B PCB Ass'y


52100874-00
FPK-S3
D1
TEAC
LEDPCB-150

LED B PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200087400	PCB Ass'y
	5210087400	PCB
D1	5225008800	LED Ass'y (RED)

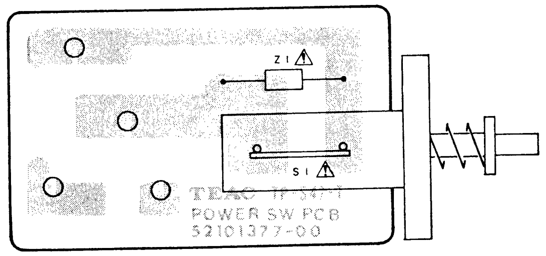
3-11. LED PCB Ass'y [M-520]


TEAC
LED PCB TP-S47-T
52101378-00
(RED)

LED PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200137800	PCB Ass'y
	5210137800	PCB
D12	5225005400	LED, SLP-135B (RED)
	5122373000	Connector Socket 2P

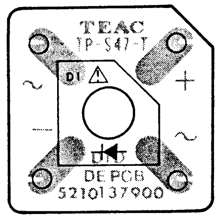
3-12. POWER SW PCB Ass'y [M-520]


Z1
S1
TEAC TP-S47-T
POWER SW PCB
52101377-00

POWER SW PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200137700	PCB Ass'y [J]
	*5200137710	PCB Ass'y [U]
	*5200137720	PCB Ass'y [C]
	*5200137730	PCB Ass'y [GE]
	*5200137740	PCB Ass'y [E, UK, A]
	5210137700	PCB
S1	⚠ 5300030800	Switch, Power
Z1	⚠ 5052905000	Spark Killer 0.01μF + 20Ω/300V [J]
	⚠ 5052910000	Spark Killer 0.033μF + 120Ω/250V [U]
	⚠ 5292002600	Spark Killer 0.033μF + 120Ω/250V [C]
	⚠ 5292002500	Spark Killer 0.01μF + 300Ω/300V [GE]
	⚠ 5267702500	Spark Killer 0.0047μF/250V [E, UK, A]

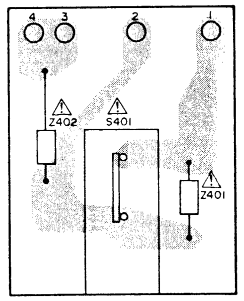
3-13. DIODE PCB Ass'y [M-520]


TEAC
TP-S47-T
D1
D4
~
+
−
DIODE PCB
52101379OO

DIODE PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200137900	PCB Ass'y
	5210137900	PCB
D1, D4	⚠ 5143147000	Diode KBPC802

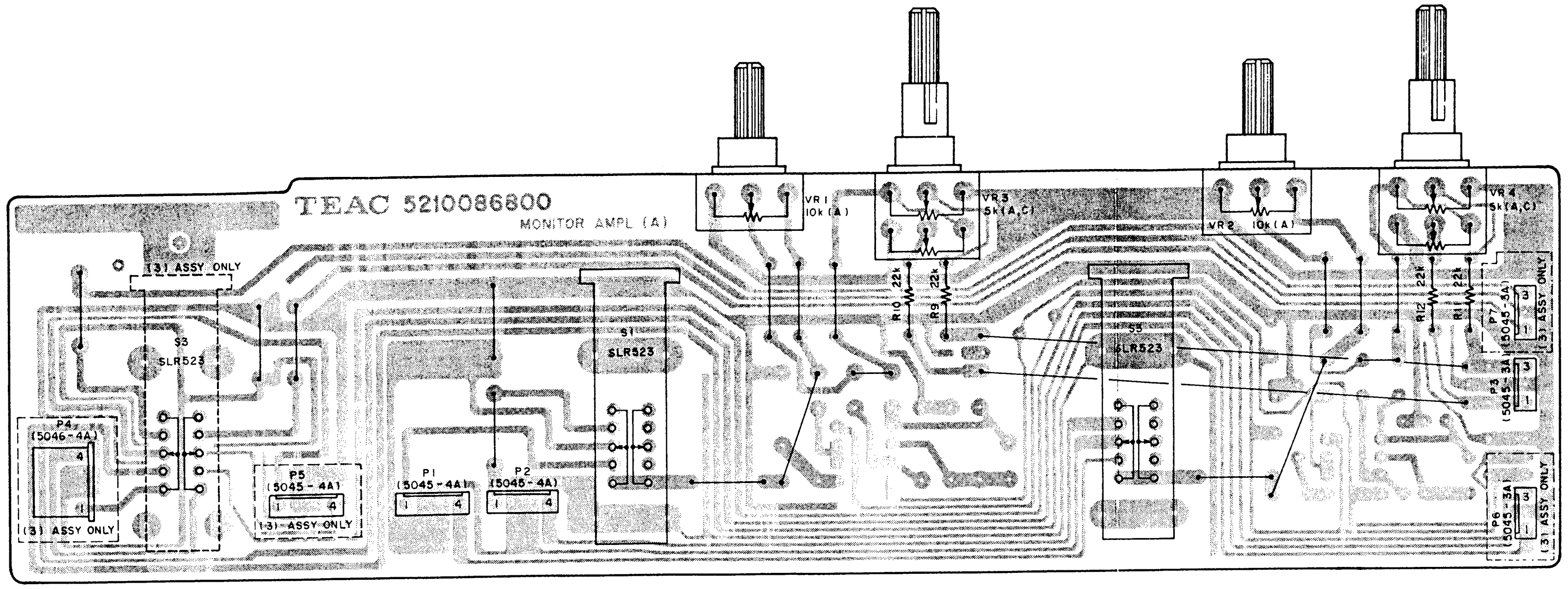
3-14. POWER SW PCB Ass'y [M-512]


4
3
2
1
Z402
S401
Z401

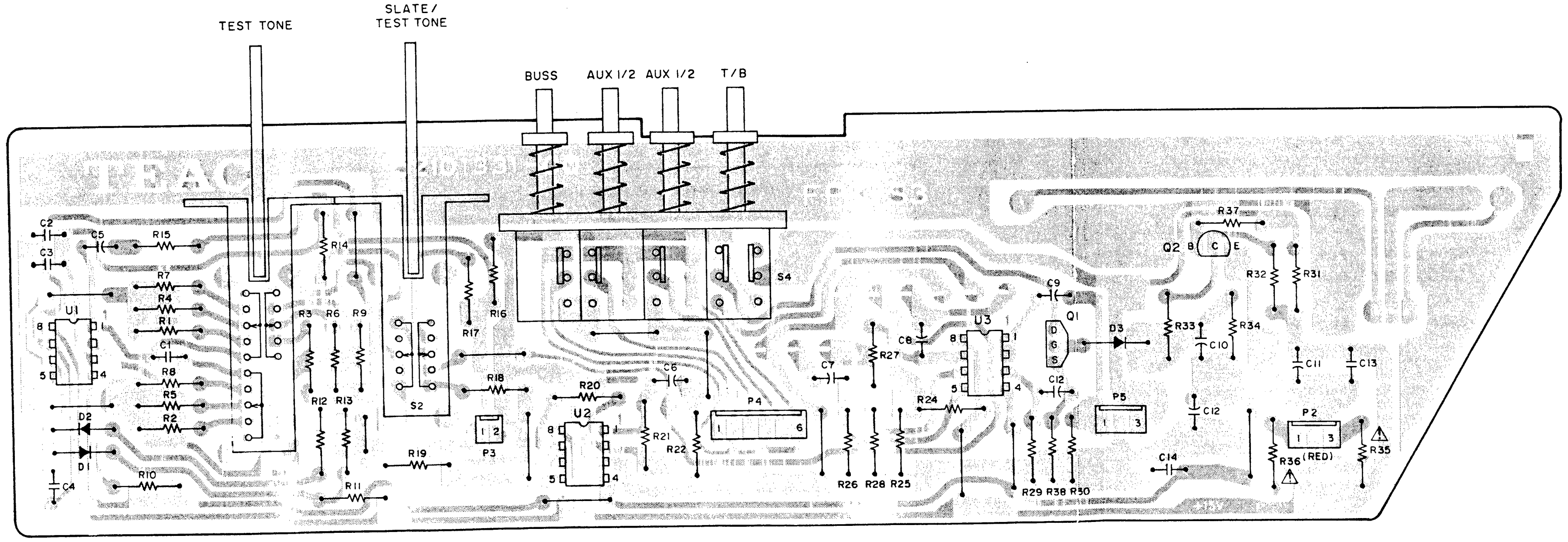
POWER SW PCB Ass'y [M-512]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200127000	PCB Ass'y [J]
	*5200127010	PCB Ass'y [U]
	*5200127020	PCB Ass'y [C]
	*5200127030	PCB Ass'y [GE]
	*5200127041	PCB Ass'y [E, UK, A]
	5210073201	PCB
S401	⚠ 5300030800	Switch, Push
Z401	⚠ 5052907000	Spark Killer 0.01μF + 300Ω/300V [J]
	⚠ 5052910000	Spark Killer 0.033μF + 120Ω/125V [U]
	⚠ 5292002600	Spark Killer 0.033μF + 120Ω/125V [C]
	⚠ 5292002500	Spark Killer 0.01μF + 300Ω/300V [GE]
	⚠ 5267702500	Spark Killer 0.0047μF/250V [E, UK, A]
Z402	⚠ 5267702600	Spark killer 0.047μF/250V [E, UK, A]

MONITOR AMPL. A PCB Ass'y [M-512]


TEAC 5210086800
MONITOR AMPL (A)
VR1 10k(A)
VR3 5k(A,C)
VR2 10k(A)
VR4 5k(A,C)
(3) ASSY ONLY
S3 SLR523
S1 SLR523
S2 SLR523
P4 (5046-4A)
P5 (5045-4A)
P1 (5045-4A)
P2 (5045-4A)
R10 22k
R9 22k
R12 22k
R11 22k
P7 (5045-3A)
P6 (5045-3A)
(3) ASSY ONLY

TALKBACK PCB Ass'y


TEST TONE
SLATE/ TEST TONE
BUSS
AUX 1/2
AUX 1/2
T/B
TEAC
C2
C3
C5
R15
R14
R7
R4
R1
C1
R8
R5
R2
U1
D2
D1
C4
R10
R3 R6 R9
R12 R13
R11
R17
R16
R18
S2
R19
P3
R20
C6
U2
R21
R22
S4
P4
C7
C8
R27
U3
C9
Q1
D
G
S
C12
R24
R26 R28 R25
R29 R38 R30
P5
C14
D3
R33
C10
R34
R37
Q2 B C E
R32
R31
C11
C13
C12
P2
R36 (RED)
R35

MONITOR AMPL. A PCB ASS'Y [M-512]

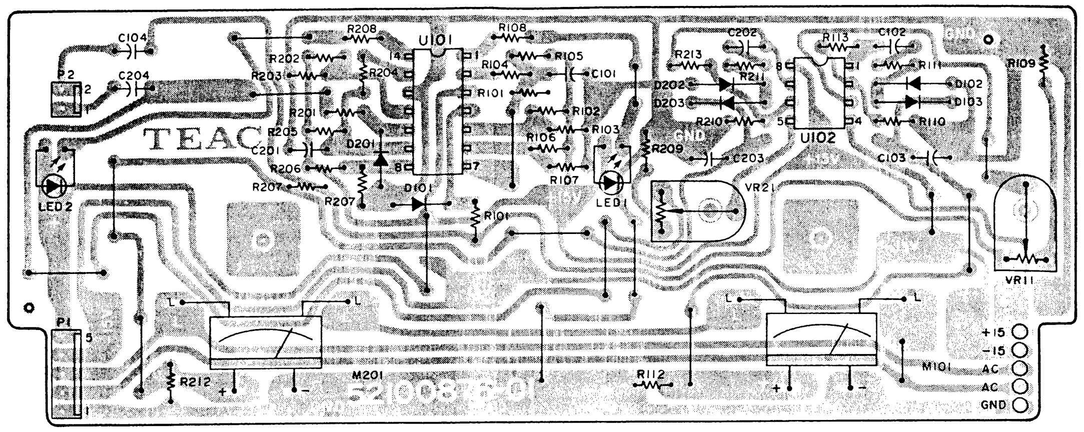
REF. NO.	PARTS NO.	DESCRIPTION
	* 5200086820	PCB Ass'y (3)
	* 5200086830	PCB Ass'y (4)
	5210086800	PCB
	CARBON RESISTORS	
R9 ~ R12	5181514000	22kΩ 1/4W 5%
	CONNECTOR PLUGS	
P1	5122128000	4P (WHT)
P2	5122185000	4P (BLK)
P3	5122127000	3P (WHT)
P4	5122147000	4P (WHT) [3 only]
P5	5122128000	4P (WHT) [3 only]
P6	5336107300	3P (YEL) [3 only]
P7	5122184000	3P (BLK) [3 only]
	LEVER SWITCHES	
S1, S2	5132036000	SLR523
S3	5132036000	SLR523 [3 only]
	VARIABLE RESISTORS	
VR1, VR2	5282011500	10 kΩ (A)
VR3, VR4	5282408600	5 kΩ (A, C)

ALKBACK PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION	
	*5200133100	PCB Ass'y	
	5210133100	PCB	
		IC'S	
1 ~ U3	5220406600	μPC4558C	
		TRANSISTORS	
1	5232007000	2SK-304 (EF)	
2	5145151000	2SC-1815 (GR)	
		DIODES	
1 ~ D3	5143118000	1S2473HJ	
		CARBON RESISTORS **All resistors are rated ±5% tolerance at 1/4W.**	
1 ~ R3	5181544000	390kΩ	
4 ~ R6	5181510000	15kΩ	
7 ~ R9	5181486000	1.5kΩ	
10, R11	5181492000	2.7kΩ	
12, R13	5181482000	1kΩ	
14	5181502000	6.8kΩ	
15	5181501000	6.2kΩ	
16	5181474000	470Ω	
17	5181538000	220kΩ	
18	5181482000	1kΩ	
19	5181530000	100kΩ	
20	5181510000	15kΩ	
21, R22	5181522000	47kΩ	
24	5181504000	8.2kΩ	
25	5181500000	5.6kΩ	
26	5181522000	47kΩ	
27	5181530000	100kΩ	
28	5181482000	1kΩ	
29, R30	5181522000	47kΩ	
31	5181506000	10kΩ	
32	5181514000	22kΩ	
33	5181530000	100kΩ	
34	5181536000	180kΩ	
35, R36	⚠ 5183570000	47Ω	Nonflammable
37	5181530000	100kΩ	
38	5181522000	47kΩ	

REF. NO.	PARTS NO.	DESCRIPTION		
		CAPACITORS		
C1, C2	5171856000	Mylar	0.01μF	
C3	5170352000	Mylar	0.001μF	
C4	5171856000	Mylar	0.01μF	
C5, C6	5260163452	Elec.	22μF	25V
C7	5260162550	Elec.	10μF	16V
C8, C9	5260163452	Elec.	22μF	25V
C10	5260160750	Elec.	1μF	50V
C11, C12	5260166052	Elec.	100μF	16V
C13, C14	5054204000	Ceramic	0.01μF	50V
C15	5260162550	Elec.	10μF	16V
		VARIABLE RESISTORS		
VR1, VR2	5282011600	Semi-fixed	10kΩ (A)	
		SWITCHES		
S1	5132040000	Lever, SLR543		
S2	5132036000	Lever, SLR523		
S3	5300032100	Push, 4-gang		
		CONNECTOR PLUGS		
P2	5122300000	3P (RED)		
P3	5122126000	2P (WHT)		
P4	5122130000	6P (WHT)		
P5	5122184000	3P (BLK)		
		MISCELLANEOUS		
M1	6055017000	MIC, EM10PB		

3-17. METER AMPL. PCB Ass'y

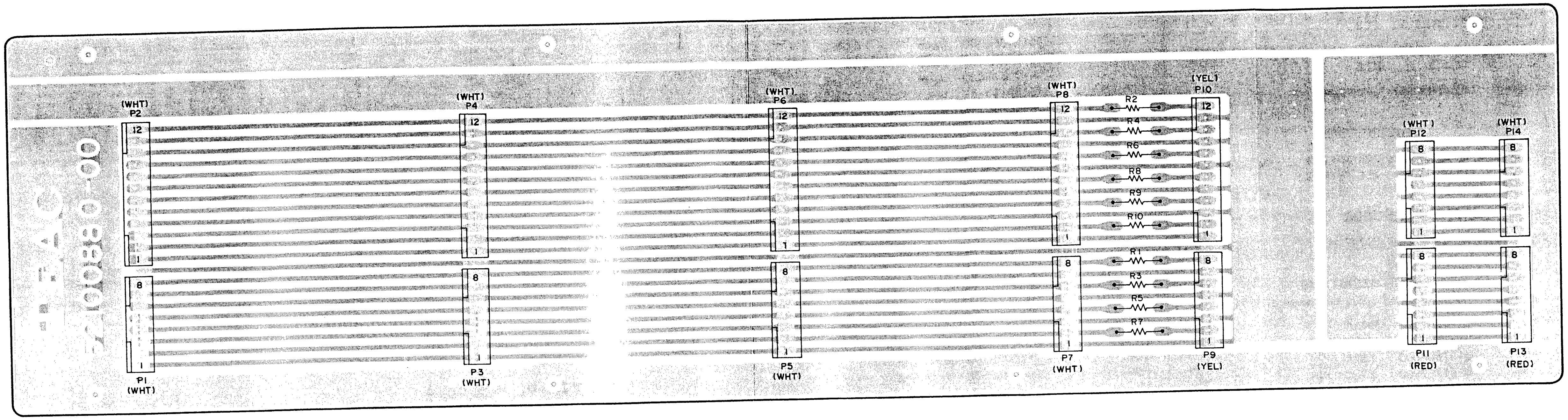


METER AMPL. PCB Ass'y

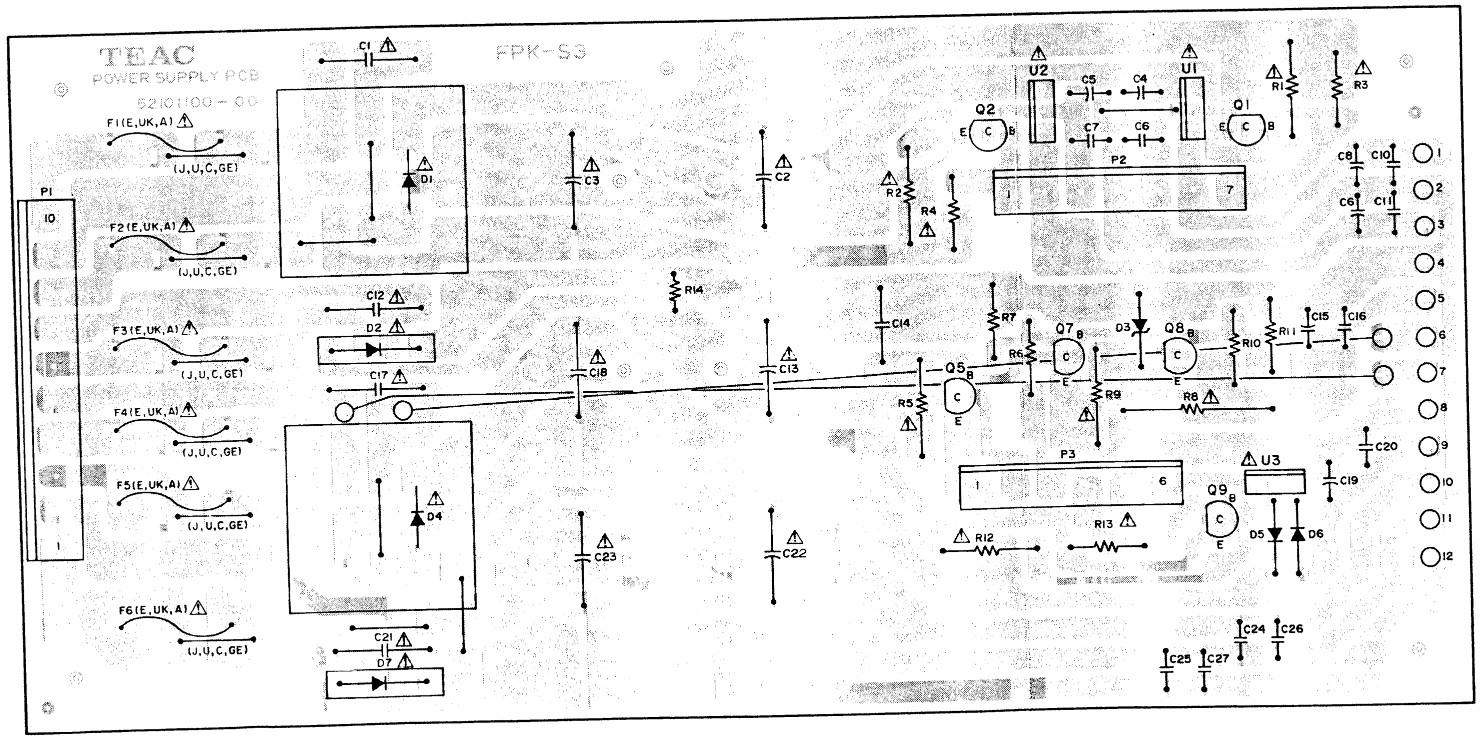
REF. NO.	PARTS NO.	DESCRIPTION
	*5200087602	PCB Ass'y
	5210087601	PCB
		IC'S
U101	5220416900	LM339N
U102	5220406600	μPC4558C
		DIODES
D101	5042517000	IS2473VE
D102, D103	5224015400	IK60
D201	5042517000	IS2473VE
D202, D203	5224015400	IK60
		CARBON RESISTERS **All resistors are rated ±5% tolerance at 1/4W.**
R101	5240173000	100kΩ
R102	5240173400	150kΩ
R103	5240171100	16kΩ
R104	5240165800	100Ω
R105	5240173000	100kΩ
R106	5240171600	27kΩ
R107	5240172200	47kΩ
R108	5240168600	1.5kΩ
R109	5240170600	10kΩ
R110	5240171200	18kΩ
R111, R112	5240168800	1.8kΩ
R113	5240173000	100kΩ
R201	5240173000	100kΩ
R202	5240173400	150kΩ
R203	5240171100	16kΩ

REF. NO.	PARTS NO.	DESCRIPTION		
R204	5240165800	100Ω		
R205	5240173000	100kΩ		
R206	5240171600	27kΩ		
R207	5240172200	47kΩ		
R208	5240168600	1.5kΩ		
R209	5240170600	10kΩ		
R210	5240171200	18kΩ		
R211, R212	5240168800	1.8kΩ		
R213	5240173000	100kΩ		
		CAPACITORS		
C101	5260160750	Elec.	1μF	50V
C102	5260163452	Elec.	22μF	25V
C103	5260162050	Elec.	4.7μF	35V
C104	5260162550	Elec.	10μF	16V
C201	5260160750	Elec.	1μF	50V
C202	5260163452	Elec.	22μF	25V
C203	5260162050	Elec.	4.7μF	35V
C204	5260162550	Elec.	10μF	16V
		VARIABLE RESISTORS		
VR11	5280003502	Semi-fixed	10kΩ (B)	
VR21	5280003502	Semi-fixed	10kΩ (B)	
		MISCELLANEOUS		
M101, M201	5296006101	VU Meter		
D1, D2	5225006900	LED, PR3432S		
	5800385100	LED Spacer		
P1	6052379005	Connector Plug, 5P (WHT)		
P2	6052379002	Connector Plug, 2P (WHT)		

MOTHER A PCB Ass'y [M-512]


(WHT)
P2
12
1
8
P1
(WHT)
(WHT)
P4
P3
(WHT)
(WHT)
P6
P5
(WHT)
(WHT)
P8
P7
(WHT)
R2
R4
R6
R8
R9
R10
R1
R3
R5
R7
(YEL)
P10
P9
(YEL)
(WHT)
P12
(WHT)
P14
P11
(RED)
P13
(RED)

POWER SUPPLY PCB Ass'y [M-512]


TEAC
POWER SUPPLY PCB
FPK-53
P1
10
1
F1(E,UK,A)
(J,U,C,GE)
F2(E,UK,A)
F3(E,UK,A)
F4(E,UK,A)
F5(E,UK,A)
F6(E,UK,A)
C1
D1
C3
C2
C12
D2
C17
C18
C13
C14
D4
C23
C22
C21
D7
U2
C5
C4
C7
C6
P2
U1
Q2
Q1
R1
R3
R2
R4
R14
C8
C10
C9
C11
R7
Q7
D3
Q8
R6
R10
R11
C15
C16
Q5
R5
R9
R8
P3
U3
C20
C19
Q9
D5
D6
R12
R13
C24
C26
C25
C27

MOTHER A PCB Ass'y [M-512]

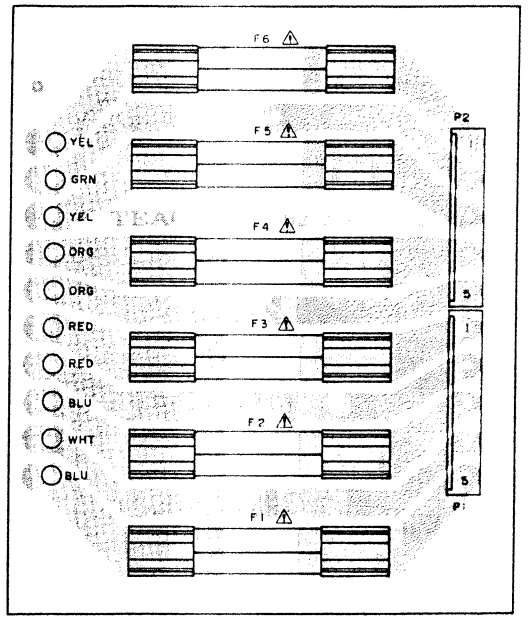
REF. NO.	PARTS NO.	DESCRIPTION
	* 5200088000	PCB Ass'y
	5210088000	PCB
	CARBON RESISTORS	
	All resistors are rated ±5%, tolerance at 1/4W.	
R1 ~ R10	5181514000	22kΩ
	CONNECTOR PLUGS	
P1	5122132000	8P (WHT)
P2	5122136000	12P (WHT)
P3	5122132000	8P (WHT)
P4	5122136000	12P (WHT)
P5	5122132000	8P (WHT)
P6	5122136000	12P (WHT)
P7	5122132000	8P (WHT)
P8	5122136000	12P (WHT)
P9	5336107800	8P (YEL)
P10	5336108200	12P (YEL)
P11	5122305000	8P (RED)
P12	5122132000	8P (WHT)
P13	5122305000	8P (RED)
P14	5122132000	8P (WHT)
P15	5122128000	4P (WHT)

POWER SUPPLY PCB Ass'y [M-512]

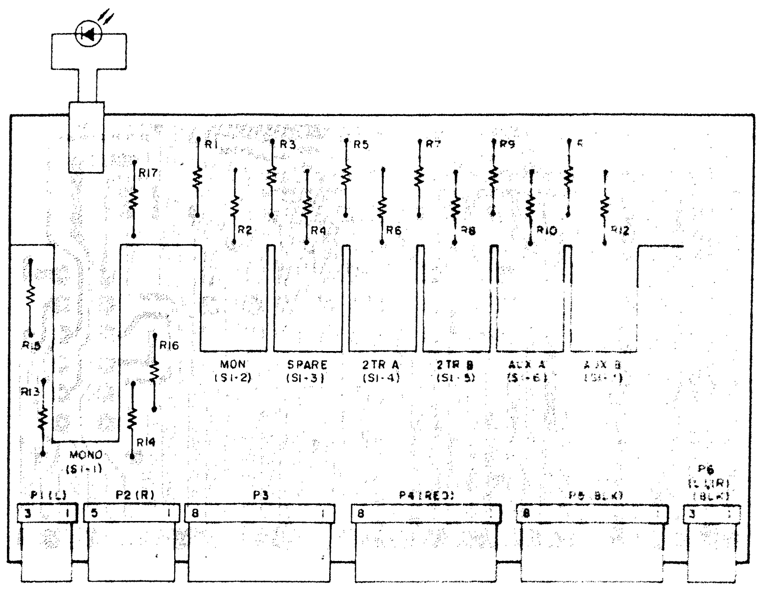
REF. NO.	PARTS NO.	DESCRIPTION
	*5200110001	PCB Ass'y [J, U, C, GE]
	*5200110011	PCB Ass'y [E.UK, A]
	5210110000	PCB
		IC'S
U1	⚠ 5220415600	7815
U2	⚠ 5220412400	7915
U3	⚠ 5220405100	78M05
		TRANSISTORS
Q1	5230014000	2SA-1020 (Y)
Q2	5230773800	2SC-2655 (Y)
Q5	5230773800	2SC-2655 (Y)
Q7, Q8	5230773800	2SC-2655 (Y)
Q9	5230014000	2SA-1020 (Y)
		DIODES
D1	⚠ 5228007200	D4BB20
D2	⚠ 5228006600	KBP604 G1
D3	⚠ 5224545501	RD24EEB3, Zener
D4	⚠ 5228007200	D4BB20
D5, D6	5143211800	1S2473HJ
D7	⚠ 5228006600	KBP604 G1
		CARBON RESISTORS **All resistors are roted ±5% tolerance, 1/4watt and of carbon type unless otherwise noted.**
R1, R2	⚠ 5184247000	82Ω Nonflammable
R3, R4	⚠ 5185191000	0.33Ω 2W Metal Film
R5	⚠ 5182042000	6.8kΩ Nonflammable
R6	5181486000	1.5kΩ
R7	5181522000	47kΩ
R8	⚠ 5052810000	10Ω 2W Metal Film
R9	⚠ 5180094000	3.3kΩ 1/2W
R10	5181498000	4.7kΩ
R11	5181500000	5.6kΩ
R12	⚠ 5184247000	82Ω Nonflammable
R13	⚠ 5185191000	0.33Ω 2W Metal Film
R14	5240173000	100kΩ

REF. NO.	PARTS NO.	DESCRIPTION		
		CAPACITORS		
C1	⚠ 5263164500	Metalized	0.047μF	250V
C2, C3	⚠ 5262001800	Elec.	4700μF	35V
C4, C5	5260160750	Elec.	1μF	50V
C6, C7	5054204000	Ceramic	0.01μF	50V
C8, C9	5260165252	Elec.	47μF	25V
C10, C11	5054204000	Ceramic	0.01μF	50V
C12	⚠ 5263164500	Metalized	0.047μF	250V
C13	⚠ 5262001900	Elec.	1000μF	100V
C14	5054223000	Ceramic	0.01μF	500V
C15	5260163150	Elec.	10μF	100V
C16	5054223000	Ceramic	0.01μF	500V
C17	⚠ 5263164500	Metalized	0.047μF	250V
C18	⚠ 5262002000	Elec.	10000μF	25V
C19	5260165252	Elec.	47μF	25V
C20	5054204000	Ceramic	0.01μF	50V
C21	⚠ 5263164500	Metalized	0.047μF	250V
C22, C23	⚠ 5262002500	Elec.	4700μF	50V
C24~C27	5054204000	Ceramic	0.01μF	50V
		CONNECTOR PLUGS		
P1	5336091000	10P		
P2	5336090700	7P		
P3	5336070600	6P		
		FUSES		
F1, F2	⚠ 5142189000	T2A 250V Mini [E, UK, A]		
F3	⚠ 5041140000	T1A 250V Mini [E, UK, A]		
F4	⚠ 5142192000	T4A 250V Mini [E, UK, A]		
F5, F6	⚠ 5041140000	T1A 250V Mini [E, UK, A]		
		MISCELLANEOUS		
	5332014200	Holder, Mini Fuse (12 used) [E, UK, A]		

3-20. FUSE PCB Ass'y [M-512]



3-21. SW E PCB Ass'y



3-22. I

FUSE PCB Ass'y [M-512]

REF. NO.	PARTS NO.	DESCRIPTION
	* 5200135300	PCB Ass'y [J, U, C, GE]
	* 5200135310	PCB Ass'y [E, UK, A]
	5210135300	PCB
		FUSES
F1, F2	⚠ 5307021600	4A 250V [J, U, C, GE]
F3	⚠ 5307021000	2A 250V [J, U, C, GE]
F4	⚠ 5307021600	4A 250V [J, U, C, GE]
F5, F6	⚠ 5307021000	2A 250V [J, U, C, GE]
		MISCELLANEOUS
P1, P2	5336090500	Connector 5P (WHT)
	5041237000	Fuse Holder (12 used) [J, U, C, GE]

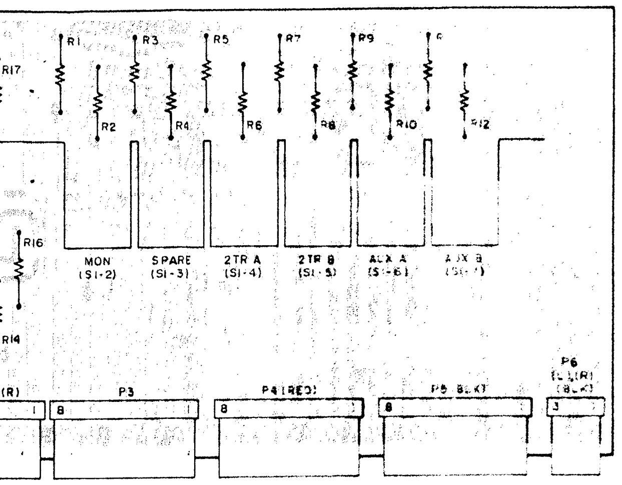
SW E PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200107800	PCB Ass'y
	5210107800	PCB
		CARBON RESISTORS **All resistors are rated ±5% tolerance at 1/4W.**
R1~R12	5181514000	22kΩ
R13, R14	5181506000	10kΩ
R15, R16	5181514000	22kΩ
R17	5181470000	330Ω
		CONNECTOR PLUGS
P1	5122146000	3P (WHT)
P2	5122148000	5P (WHT)
P3	5122151000	8P (WHT)
P4	5122459000	8P (RED)
P5	5122208000	8P (BLK)
P6	5122203000	3P (BLK)
		MISCELLANEOUS
S1	5300030200	Switch, Push
D1	5225006900	LED, PR3432S
	5122373000	Connector Socket, 2P (WHT)

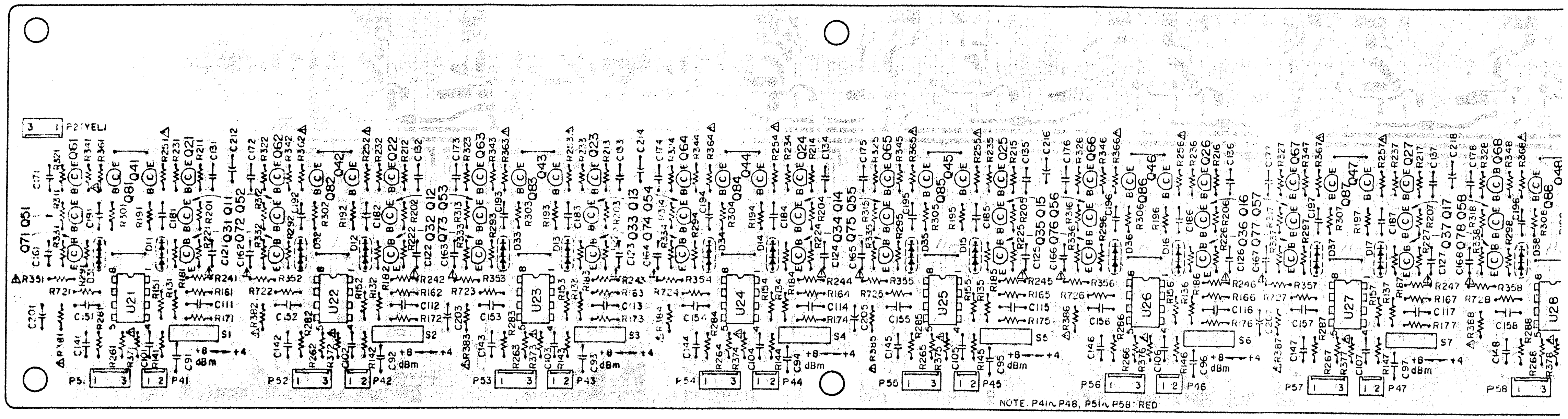
IN/OUT

REF. NC
U021 U
Q01
Q021
Q031 ~ Q
Q041 ~ Q
Q051 ~ Q
Q061 ~ Q
Q071 ~ Q
Q081 ~ Q
D011 ~ D
D021 ~ D

E PCB Ass'y



3-22. IN/OUT AMPL. PCB Ass'y



NOTE. P41~P48, P51~P58: RED

SW E PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200107800	PCB Ass'y
	5210107800	PCB

CARBON RESISTORS

All resistors are rated ± 5% tolerance at 1/4W.

REF. NO.	PARTS NO.	DESCRIPTION
R1 ~ R12	5181514000	22kΩ
R13, R14	5181506000	10kΩ
R15, R16	5181514000	22kΩ
R17	5181470000	330Ω

CONNECTOR PLUGS

REF. NO.	PARTS NO.	DESCRIPTION
P1	5122146000	3P (WHT)
P2	5122148000	5P (WHT)
P3	5122151000	8P (WHT)
P4	5122459000	8P (RED)
P5	5122208000	8P (BLK)
P6	5122203000	3P (BLK)

MISCELLANEOUS

REF. NO.	PARTS NO.	DESCRIPTION
S1	5300030200	Switch, Push
D1	5225006900	LED, PR3432S
	5122373000	Connector Socket, 2P (WHT)

IN/OUT AMPL. PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	* 5200128810	PCB Ass'y
	5210128800	PCB

IC'S

REF. NO.	PARTS NO.	DESCRIPTION
U021 ~ U028	5220416600	NJM2041D-D

TRANSISTORS

REF. NO.	PARTS NO.	DESCRIPTION
Q011 ~ Q018	5145151000	2SC-1815GR
Q021 ~ Q028	5145150000	2SA-1015GR
Q031 ~ Q038	5230773800	2SC-2655Y
Q041 ~ Q048	5230014000	2SA-1020Y
Q051 ~ Q058	5145151000	2SC-1815GR
Q061 ~ Q068	5145150000	2SA-1015GR
Q071 ~ Q078	5230773800	2SC-2655Y
Q081 ~ Q088	5230014000	2SA-1020Y

DIODES

REF. NO.	PARTS NO.	DESCRIPTION
D011 ~ D018	5224015300	MC931
D021 ~ D028	5224015300	MC931

CARBON RESISTORS

All resistors are rated ± 5% tolerance at 1/4 watt.

REF. NO.	PARTS NO.	DESCRIPTION
R131 ~ R138	5240028220	1kΩ
R141 ~ R148	5240031420	22kΩ
R151 ~ R158	5240030620	10kΩ
R161 ~ R168	5240030620	10kΩ
R171 ~ R178	5240030820	12kΩ
R181 ~ R188	5240031020	15kΩ
R191 ~ R198	5240031020	15kΩ
R201 ~ R208	5240029820	4.7kΩ
R211 ~ R218	5240029820	4.7kΩ
R221 ~ R228	5240028220	1kΩ
R231 ~ R238	5240028220	1kΩ
R241 ~ R248	⚠ 5183546000	4.7Ω Nonframmable
R251 ~ R258	⚠ 5183546000	4.7Ω Nonframmable
R261 ~ R268	5241320600	10kΩ metalized
R271 ~ R278	5241320600	10kΩ metalized
R281 ~ R288	5240030620	10kΩ
R291 ~ R298	5240031020	15kΩ
R301 ~ R308	5240031020	15kΩ
R311 ~ R318	5240029820	4.7kΩ
R321 ~ R328	5240029820	4.7kΩ
R331 ~ R338	5240028220	1kΩ
R341 ~ R348	5240028220	1kΩ
R351 ~ R358	⚠ 5183546000	4.7Ω Nonframmable
R361 ~ R368	⚠ 5183546000	4.7Ω Nonframmable
R371 ~ R378	⚠ 5183554000	10Ω Nonframmable
R381 ~ R388	⚠ 5183554000	10Ω Nonframmable

CAPACITORS

REF. NO.	PARTS NO.	DESCRIPTION			
C091 ~ C098	5260067050	Elec.	10μF	16V	(B.P.)
C101 ~ C108	5260067050	Elec.	10μF	16V	(B.P.)
C111 ~ C118	5172206000	Ceramic.	33pF	50V	
C121 ~ C128	5172204000	Ceramic.	22pF	50V	
C131 ~ C138	5172204000	Ceramic.	22pF	50V	
C141 ~ C148	5260067050	Elec.	10μF	16V	(B.P.)
C151 ~ C158	5172206000	Ceramic.	33pF	50V	
C161 ~ C168	5172204000	Ceramic.	22pF	50V	
C171 ~ C178	5172204000	Ceramic.	22pF	50V	
C181 ~ C188	5260067050	Elec.	10μF	16V	(B.P.)
C191 ~ C198	5260067050	Elec.	10μF	16V	(B.P.)
C201, C203,	5260165252	Elec.	47μF	25V	
C205, C207	5260165252	Elec.	47μF	25V	
C212, C214	5260165252	Elec.	47μF	25V	
C216, C218	5260165252	Elec.	47μF	25V	

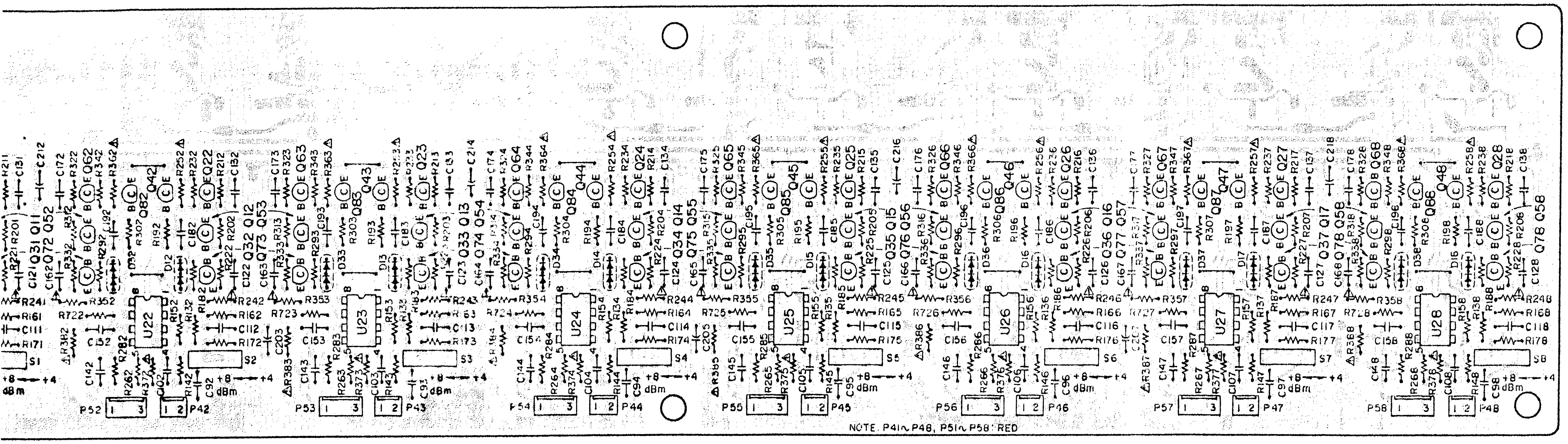
CONNECTOR PLUGS

REF. NO.	PARTS NO.	DESCRIPTION
P2	5336107300	3P (YEL)
P041 ~ P048	5122299000	2P (RED)
P051 ~ P058	5122300000	3P (RED)

SWITCHES

REF. NO.	PARTS NO.	DESCRIPTION
S1 ~ S8	5300908100	Slide, 1 – 2

'y

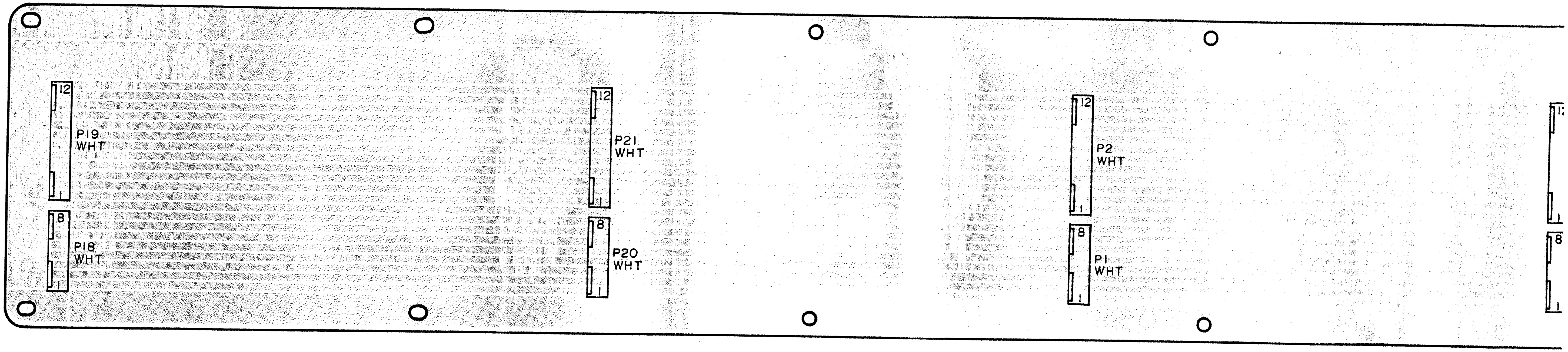


IPTION
Y
1D-D
RS
15GR
15GR
55Y
20Y
15GR
15GR
55Y
20Y

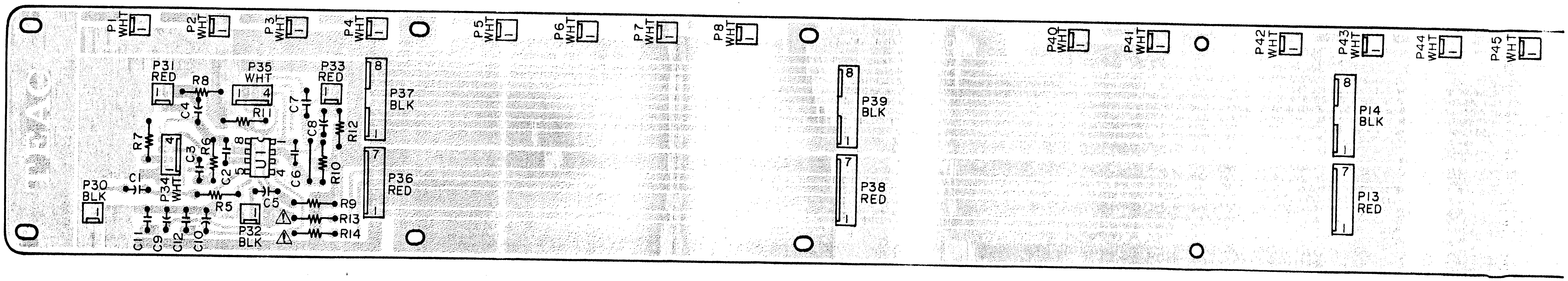
REF. NO.	PARTS NO.	DESCRIPTION	
	CARBON RESISTORS		
	All resistors are rated ± 5% tolerance at 1/4 watt.		
R131～R138	5240028220	1kΩ	
R141～R148	5240031420	22kΩ	
R151～R158	5240030620	10kΩ	
R161～R168	5240030620	10kΩ	
R171～R178	5240030820	12kΩ	
R181～R188	5240031020	15kΩ	
R191～R198	5240031020	15kΩ	
R201～R208	5240029820	4.7kΩ	
R211～R218	5240029820	4.7kΩ	
R221～R228	5240028220	1kΩ	
R231～R238	5240028220	1kΩ	
R241～R248	⚠ 5183546000	4.7Ω	Nonframmable
R251～R258	⚠ 5183546000	4.7Ω	Nonframmable
R261～R268	5241320600	10kΩ	metalized
R271～R278	5241320600	10kΩ	metalized
R281～R288	5240030620	10kΩ	
R291～R298	5240031020	15kΩ	
R301～R308	5240031020	15kΩ	
R311～R318	5240029820	4.7kΩ	
R321～R328	5240029820	4.7kΩ	
R331～R338	5240028220	1kΩ	
R341～R348	5240028220	1kΩ	
R351～R358	⚠ 5183546000	4.7Ω	Nonframmable
R361～R368	⚠ 5183546000	4.7Ω	Nonframmable
R371～R378	⚠ 5183554000	10Ω	Nonframmable
R381～R388	⚠ 5183554000	10Ω	Nonframmable

REF. NO.	PARTS NO.	DESCRIPTION			
	CAPACITORS				
C091～C098	5260067050	Elec.	10μF	16V	(B.P.)
C101～C108	5260067050	Elec.	10μF	16V	(B.P.)
C111～C118	5172206000	Ceramic.	33pF	50V	
C121～C128	5172204000	Ceramic.	22pF	50V	
C131～C138	5172204000	Ceramic.	22pF	50V	
C141～C148	5260067050	Elec.	10μF	16V	(B.P.)
C151～C158	5172206000	Ceramic.	33pF	50V	
C161～C168	5172204000	Ceramic.	22pF	50V	
C171～C178	5172204000	Ceramic.	22pF	50V	
C181～C188	5260067050	Elec.	10μF	16V	(B.P.)
C191～C198	5260067050	Elec.	10μF	16V	(B.P.)
C201, C203,	5260165252	Elec.	47μF	25V	
C205, C207	5260165252	Elec.	47μF	25V	
C212, C214	5260165252	Elec.	47μF	25V	
C216, C218	5260165252	Elec.	47μF	25V	
	CONNECTOR PLUGS				
P2	5336107300	3P (YEL)			
P041～P048	5122299000	2P (RED)			
P051～P058	5122300000	3P (RED)			
	SWITCHES				
S1 ～ S8	5300908100	Slide, 1 – 2			

3-23. MOTHER A PCB Ass'y [M-520]


P19
WHT
P18
WHT
P21
WHT
P20
WHT
P2
WHT
P1
WHT
12
8
1

3-24. MOTHER B PCB Ass'y [M-520]


P1 WHT
P2 WHT
P3 WHT
P4 WHT
P5 WHT
P6 WHT
P7 WHT
P8 WHT
P40 WHT
P41 WHT
P42 WHT
P43 WHT
P44 WHT
P45 WHT
P31
RED
P35
WHT
P33
RED
P37
BLK
P36
RED
P39
BLK
P38
RED
P14
BLK
P13
RED
P30
BLK
P32
BLK
P34
WHT
U1
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
C1
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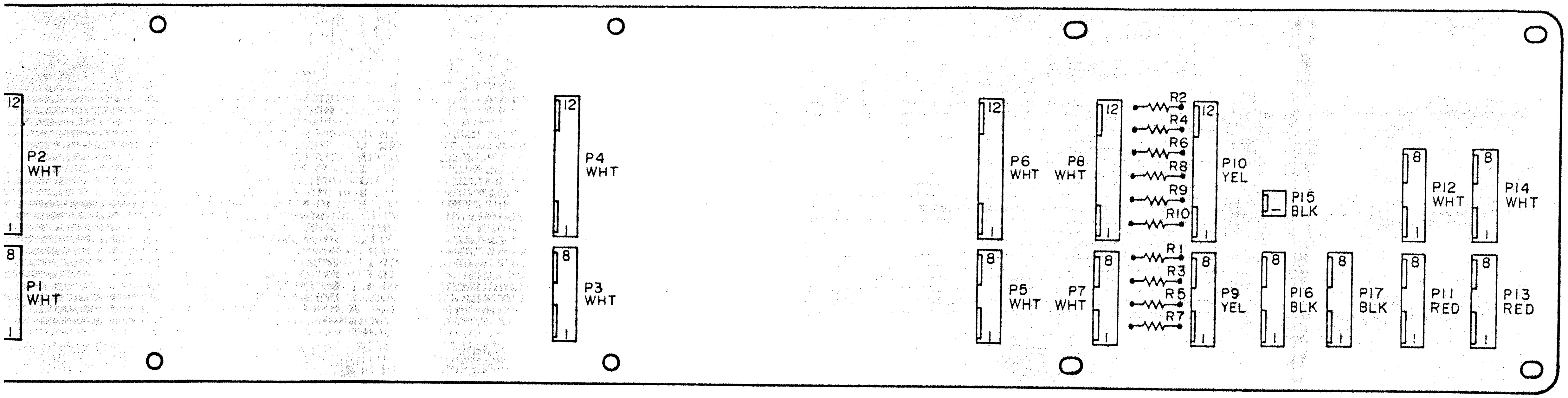
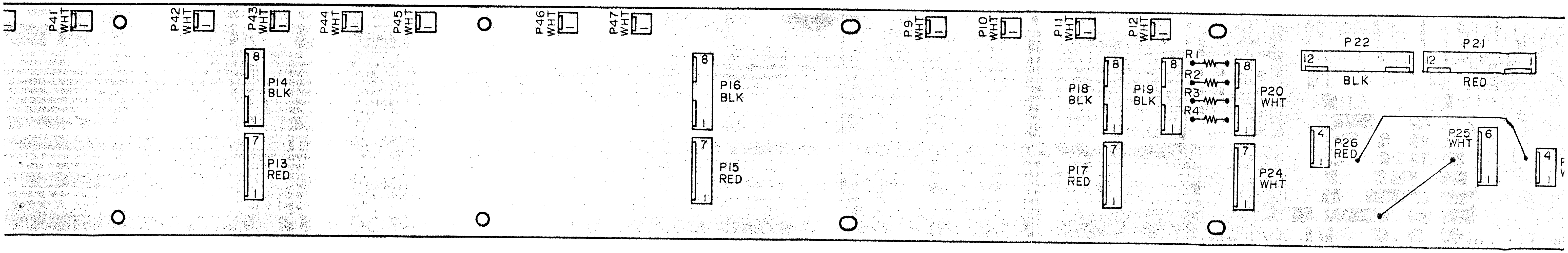
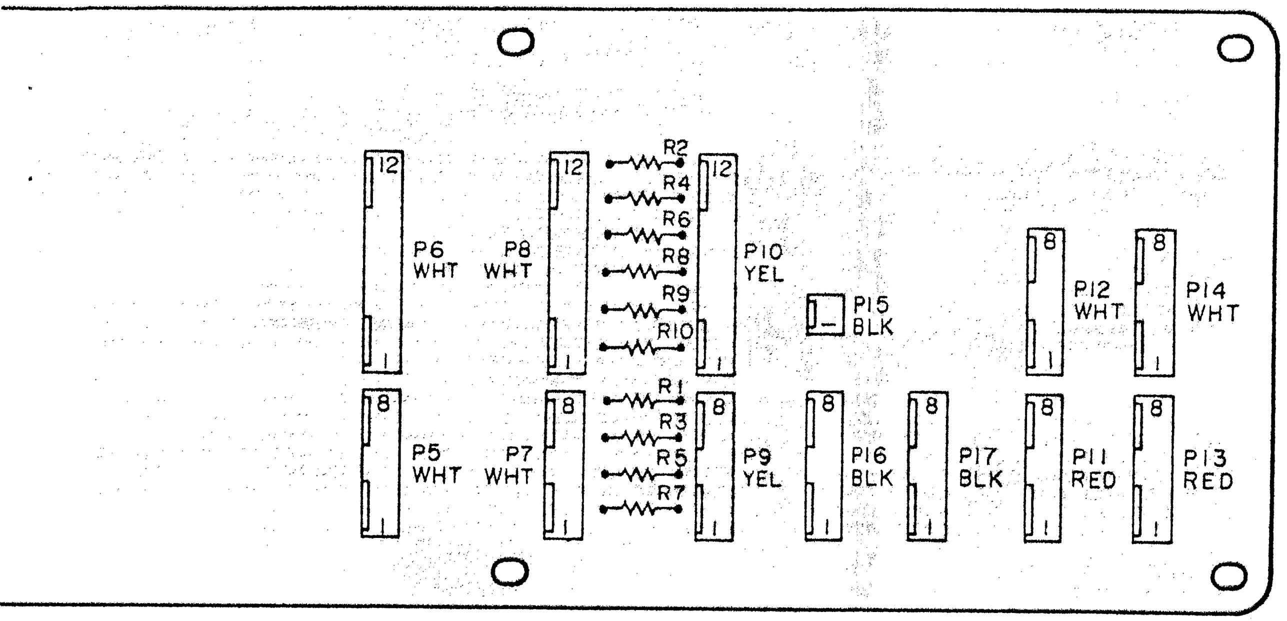
C11
C12
8
7
4
1


12
P2
WHT
8
P1
WHT
12
P4
WHT
8
P3
WHT
12
P6
WHT
8
P5
WHT
P8
WHT
P7
WHT
R2
R4
R6
R8
R9
R10
R1
R3
R5
R7
P10
YEL
P9
YEL
P15
BLK
P16
BLK
P17
BLK
P12
WHT
P14
WHT
P11
RED
P13
RED

MOTHER A PCB

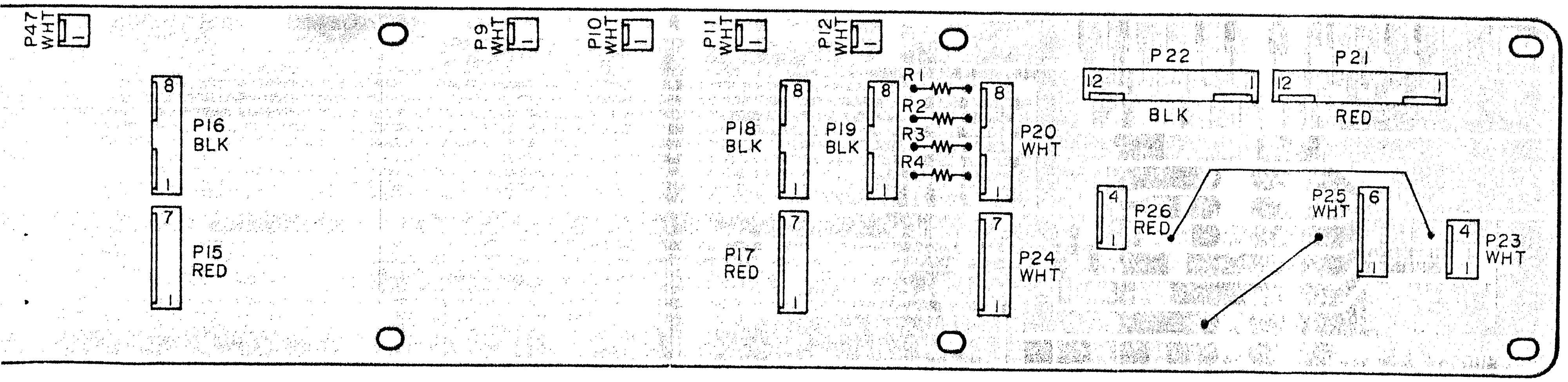
REF. NO.	PART
	52001
	52101
	C
P1	51221
P2	51221
P3	51221
P4	51221
P5	51221
P6	51221
P7	51221
P8	51221
P9	53361
P10	53361
P11, P12	51221
P13	51223
P14	51221
P15	51221
P16, P17	51221
P18	51221
P19	51221
P20	51221
P21	51221
	C.
	All resistors a
R1 ~ R10	51815


P41
WHT
P42
WHT
P43
WHT
P44
WHT
P45
WHT
P46
WHT
P47
WHT
8
P14
BLK
7
P13
RED
8
P16
BLK
7
P15
RED
P9
WHT
P10
WHT
P11
WHT
P12
WHT
8
P18
BLK
7
P17
RED
P19
BLK
R1
R2
R3
R4
P20
WHT
P24
WHT
P22
12
BLK
P21
12
RED
4
P26
RED
P25
WHT
6
4


12
12
12
P6
WHT
P8
WHT
R2
R4
R6
R8
R9
R10
P10
YEL
P15
BLK
8
8
P12
WHT
P14
WHT
8
8
8
8
8
8
8
P5
WHT
P7
WHT
R1
R3
R5
R7
P9
YEL
P16
BLK
P17
BLK
P11
RED
P13
RED

MOTHER A PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	5200132700	PCB Ass'y
	5210132700	PCB
		CONNECTOR PLUGS
P1	5122132000	8P (WHT)
P2	5122136000	12P (WHT)
P3	5122132000	8P (WHT)
P4	5122136000	12P (WHT)
P5	5122132000	8P (WHT)
P6	5122136000	12P (WHT)
P7	5122132000	8P (WHT)
P8	5122136000	12P (WHT)
P9	5336107800	8P (YEL)
P10	5336108200	12P (YEL)
P11, P12	5122132000	8P (WHT)
P13	5122305000	8P (RED)
P14	5122132000	8P (WHT)
P15	5122183000	2P (BLK)
P16, P17	5122189000	8P (BLK)
P18	5122132000	8P (WHT)
P19	5122136000	12P (WHT)
P20	5122132000	8P (WHT)
P21	5122136000	12P (WHT)
		CARBON RESISTORS All resistors are rated ± 5% tolerance 1/4 watt.
R1 ~ R10	5181514000	22 kΩ

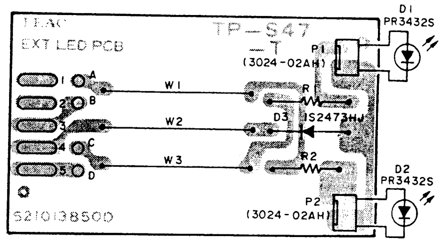

P47
WHT
P9
WHT
P10
WHT
P11
WHT
P12
WHT
P22
P21
12
12
BLK
RED
8
P16
BLK
7
P15
RED
8
P18
BLK
8
P19
BLK
R1
R2
R3
R4
8
P20
WHT
4
P26
RED
P25
WHT
6
4
P23
WHT
7
P17
RED
7
P24
WHT

MOTHER B PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200132800	PCB Ass'y
	5210132800	PCB
		IC
U1	5220416600	NJM4041DD
		CARBON RESISTORS **All resistors are rated ± 5% tolerance 1/4 watt.**
R1 ~ R4	5181514000	22kΩ
R5	5181538000	220kΩ
R6	5181554000	1MΩ
R7	5181458000	100Ω
R8	5181522000	47kΩ
R9	5181538000	220kΩ
R10	5181554000	1MΩ
R11	5181458000	100Ω
R12	5181522000	47kΩ
R13, R14	5183566000	33Ω Nonflammable
		CAPACITORS
C1	5260162550	Elec. 10μF 16V
C2	5172212000	Ceramic 100pF
C3	5260069650	Elec. 47μF 16V (B.P)
C4	5260163452	Elec. 22μF 25V
C5	5260162550	Elec. 10μF 16V
C6	5172212000	Ceramic 100pF
C7	5260069650	Elec. 47μF 16V (B.P)
C8	5260163452	Elec. 22μF 25V
C9, C10	5260165252	Elec. 47μF 25V
C11, C12	5173433000	Ceramic 0.01μF 50V

REF. NO.	PARTS NO.	DESCRIPTION
		CONNECTOR PLUGS
P1 ~ P12	5122126000	2P (WHT)
P13	5122304000	7P (RED)
P14	5122189000	8P (BLK)
P15	5122304000	7P (RED)
P16	5122189000	8P (BLK)
P17	5122304000	7P (RED)
P18, P19	5122189000	8P (BLK)
P20	5122132000	8P (WHT)
P21	5122193000	12P (BLK)
P22	5122309000	12P (RED)
P23	5122128000	4P (WHT)
P24	5122131000	7P (WHT)
P25	5122130000	6P (WHT)
P26	5122301000	4P (RED)
P30	5122183000	2P (BLK)
P31	5122299000	2P (RED)
P32	5122183000	2P (BLK)
P33	5122299000	2P (RED)
P34, P35	5122128000	4P (WHT)
P36	5122304000	7P (RED)
P37	5122189000	8P (BLK)
P38	5122304000	7P (RED)
P39	5122189000	8P (BLK)
P40 ~ P47	5122126000	2P (WHT)

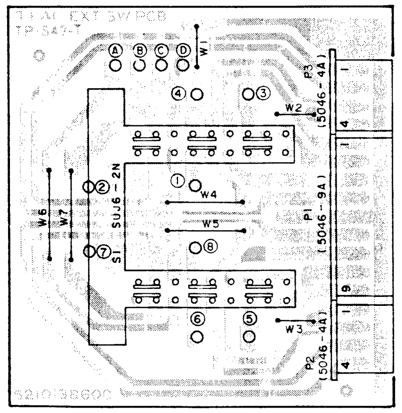
3-25. EXT. LED PCB Ass'y


TEAC
EXT LED PCB
TP-S47
-T
P1
(3024-02AH)
D1
PR3432S
1 A
2 B
3
4 C
5 D
W1
W2
W3
R1
D3
1S2473HJ
R2
D2
PR3432S
P2
(3024-02AH)
5210138500

EXT. LED PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200138500	PCB Ass'y
	5210138500	PCB
D1, D2	5225006900	LED PR3432S (RED)
D3	5143118000	Diode, 1S2473HJ
R1, R2	5181482000	Carbon Resistor 1kΩ 1/4W 5%
P1, P2	5122373000	Connector Socket 2P (WHT)

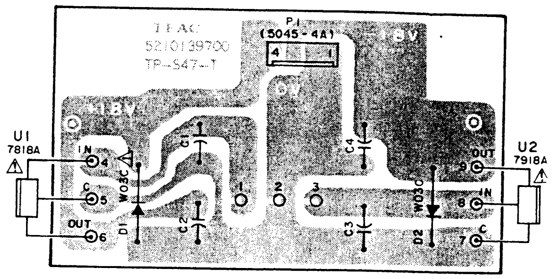
3-26. EXT. SW PCB Ass'y


TEAC EXT SW PCB
TP-S47-T
A
B
C
D
W1
W2
W3
W4
W5
W6
W7
①
②
③
④
⑤
⑥
⑦
⑧
P1
(5046-9A)
P2
(5046-4A)
P3
(5046-4A)
SUJ6-2N
S1
5210138600

EXT. SW PCB Ass'y

REF. NO.	PARTS NO.	DESCRIPTION
	*5200138600	PCB Ass'y
	5210138600	PCB
S1	5300029600	Switch, Push SUJ6-2N
P1	5122152000	Connector Plug, 9P (WHT)
P2	5122147000	Connector Plug, 4P (WHT)
P3	5336065400	Connector Plug, 4P (BLK)
	5800395700	Plate, Cord

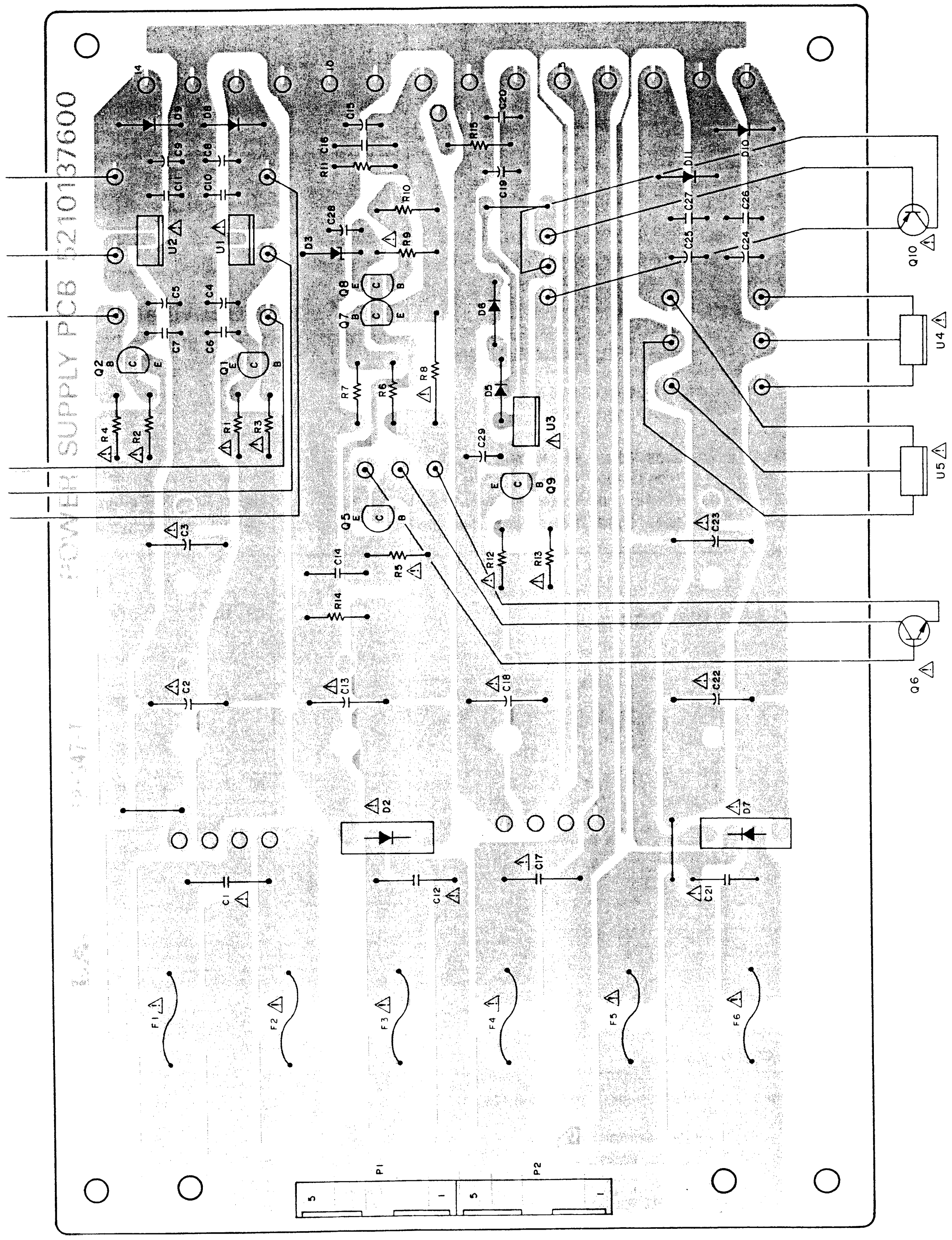
3-27. REGURATOR PCB Ass'y [M-512]


TEAC
5210139700
TP-S47-T
P1
(5045-4A)
4
1
+18V
-18V
0V
U1
7818A
⚠
IN
4
C
5
OUT
6
W03C
D1
C1
C2
1
2
3
C4
C3
W03C
D2
U2
7918A
⚠
OUT
9
IN
8
C
7

REGULATOR PCB Ass'y [M-512]

REF. NO.	PARTS NO.	DESCRIPTION
	*5200139700	PCB Ass'y
	5210139700	PCB
		IC'S
U1	⚠ 5220415700	NJM 7818A
U2	⚠ 5220421900	NJM 7918A
		DIODES
D1 ~ D2	⚠ 5143089000	W03C
		CAPACITORS
C1 ~ C4	5260165352	Elec. 47μF 35V
		MISCELLANEOUS
P1	5122301000	Connector Plug 4P (RED)

POWER SUPPLY PCB Ass'y [M-520]



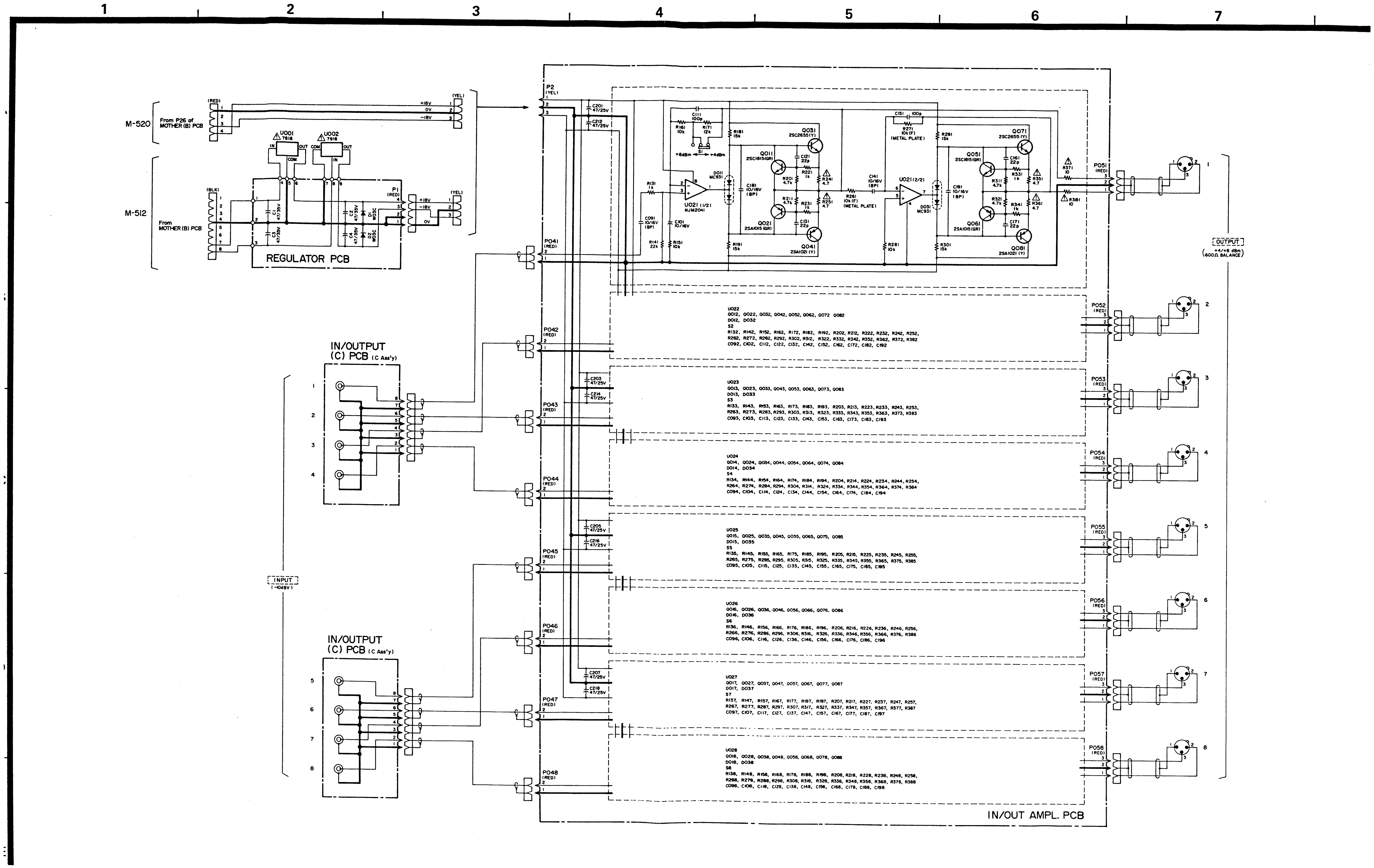
POWER SUPPLY PCB Ass'y [M-520]

REF. NO.	PARTS NO.	DESCRIPTION
	* 5200137600	PCB Ass'y [J, U, C, GE]
	* 5200137620	PCB Ass'y [E, UK, A]
	5210137600	PCB
		IC'S
U1	⚠ 5220415600	NJM7815A
U2	⚠ 5220412400	UA7915C
U3	⚠ 5220405100	μPC78M05H
U4	⚠ 5220415700	NJM7818A
U5	⚠ 5220421900	NJM7918A
		TRANSISTORS
Q1	5230014000	2SA1020 (Y)
Q2	5230773800	2SC2655 (Y)
Q3	⚠ 5230017700	2SA1264 (O)
Q4	⚠ 5230779400	2SC3181 (O)
Q5	5230773800	2SC2655 (Y)
Q6	⚠ 5230779400	2SC3181 (O)
Q7, Q8	5230773800	2SC2655 (Y)
Q9	5230014000	2SA1020 (Y)
Q10	⚠ 5230506400	2SB755 (O)
		DIODES
D2	⚠ 5228006600	KBP04GI
D3	5224545501	RD24EB3, Zener
D5, D6	5143118000	1S2473HJ
D7	⚠ 5228006600	KBP04GI
D8 ~ D11	5143089000	W03C
		CARBON RESISTORS **All resistors are rated ± 5% tolerance at 1/4 watt, unless otherwise noted.**
R1, R2	⚠ 5184247000	82Ω Nonflammable
R3, R4	⚠ 5185191000	0.33Ω Metal Film
R5	⚠ 5182042000	6.8 kΩ Nonflammable
R6	5181486000	1.5 kΩ
R7	5181522000	47 kΩ
R8	⚠ 5052810000	10Ω Metal Oxide Film 2W
R9	⚠ 5180094000	3.3kΩ 1/2W
R10	5181498000	4.7kΩ
R11	5181500000	5.6kΩ
R12	⚠ 5184247000	82Ω Nonflammable
R13	⚠ 5185191000	0.33Ω Metal Film
R14	5240173000	100kΩ
R15	5181476000	560Ω

REF. NO.	PARTS NO.	DESCRIPTION		
		CAPACITORS		
C1	⚠ 5263164500	Metalized Mylar	0.047μF	250V
C2, C3	⚠ 5262001800	Elec.	4700μF	35V
C4, C5	5260160750	Elec.	1μF	50V
C6, C7	5054204000	Ceramic	0.01μF	50V
C8, C9	5260165252	Elec.	47μF	25V
C10, C11	5054204000	Ceramic	0.01μF	50V
C12	⚠ 5263164500	Metalized Mylar	0.047μF	250V
C13	⚠ 5262001900	Elec.	1000μF	100V
C14	5054223000	Ceramic	0.01μF	500V
C15	5260163150	Elec.	10μF	100V
C16	5054223000	Ceramic	0.01μF	500V
C17	⚠ 5263164500	Metalized Mylar	0.047μF	250V
C18	⚠ 5262002000	Elec.	10000μF	25V
C19	5260165252	Elec.	47μF	25V
C20	5054204000	Ceramic	0.01μF	50V
C21	⚠ 5263164500	Metalized Mylar	0.047μF	250V
C22, C23	⚠ 5262001800	Elec.	4700μF	35V
C24, C25	5260165252	Elec.	47μF	25V
C26, C27	5054204000	Ceramic	0.01μF	50V
C28	5260162850	Elec.	10μF	50V
C29	5260160750	Elec.	1μF	50V
		FUSES		
F1, F2	⚠ 5307021600	4A 250V [J, U, C, GE]		
	⚠ 5142192000	T4A 250V Mini [E, UK, A]		
F3	⚠ 5307021000	2A 250V [J, U, C, GE]		
	⚠ 5142189000	T2A 250V Mini [E, UK, A]		
F4	⚠ 5307021600	4A 250V [J, U, C, GE]		
	⚠ 5142192000	T4A 250V Mini [E, UK, A]		
F5, F6	⚠ 5307021000	2A 250V [J, U, C, GE]		
	⚠ 5142189000	T2A 250V Mini [E, UK, A]		
		MISCELLANEOUS		
	5041237000	Holder, Fuse (12 used) [J, U, C, GE]		
	5332014200	Holder, Mini Fuse (12 used) [E, UK, A]		
P1, P2	5336095000	Connector Plug, 5P		

4. SCHEMATIC DIAGRAM

4-1. In/Out Ampl. PCB/Regulator PCB


1
2
3
4
5
6
7
M-520
From P26 of MOTHER (B) PCB
(RED)
(YEL)
+18V
0V
−18V
U001 7818
U002 7918
IN
OUT
COM
M-512
From MOTHER (B) PCB
(BLK)
C1 47/35V
C3 47/35V
C2 47/35V
C4 47/35V
D1 W03C
D2 W03C
P1 (RED)
REGULATOR PCB
P2 (YEL)
C201 47/25V
C212 47/25V
C111 100p
R161 10k
R171 12k
S1
+6dBm ← → +4dBm
R181 15k
R191 15k
R131 1k
R141 22k
R151 10k
C091 10/16V (BP)
C101 10/16V
U021 (1/2) NJM2041
D011 MC931
C181 10/16V (BP)
Q011 2SC1815(GR)
Q021 2SA1015 (GR)
Q031 2SC2655(Y)
Q041 2SA1021 (Y)
C121 22p
C131 22p
R201 4.7k
R211 4.7k
R221 1k
R231 1k
R241 4.7
R251 4.7
C141 10/16V (BP)
R261 10k (F) (METAL PLATE)
C151 100p
R271 10k (F) (METAL PLATE)
U021 (2/2)
R281 10k
D031 MC931
R291 15k
R301 15k
C191 10/16V (BP)
Q051 2SC1815(GR)
Q061 2SA1015(GR)
Q071 2SC2655 (Y)
Q081 2SA1021 (Y)
C161 22p
C171 22p
R311 4.7k
R321 4.7k
R331 1k
R341 1k
R351 4.7
R361 4.7
R371 10
R381 10
P051 (RED)
P052 (RED)
P053 (RED)
P054 (RED)
P055 (RED)
P056 (RED)
P057 (RED)
P058 (RED)
P041 (RED)
P042 (RED)
P043 (RED)
P044 (RED)
P045 (RED)
P046 (RED)
P047 (RED)
P048 (RED)
C203 47/25V
C214 47/25V
C205 47/25V
C216 47/25V
C207 47/25V
C218 47/25V
IN/OUTPUT (C) PCB (C Ass'y)
IN/OUTPUT (C) PCB (C Ass'y)
INPUT (−10dBV)
OUTPUT +4/+8 dBm (600Ω BALANCE)
IN/OUT AMPL. PCB

U022
Q012, Q022, Q032, Q042, Q052, Q062, Q072 Q082
D012, D032
S2
R132, R142, R152, R162, R172, R182, R192, R202, R212, R222, R232, R242, R252,
R262, R272, R282, R292, R302, R312, R322, R332, R342, R352, R362, R372, R382
C092, C102, C112, C122, C132, C142, C152, C162, C172, C182, C192

U023
Q013, Q023, Q033, Q043, Q053, Q063, Q073, Q083
D013, D033
S3
R133, R143, R153, R163, R173, R183, R193, R203, R213, R223, R233, R243, R253,
R263, R273, R283, R293, R303, R313, R323, R333, R343, R353, R363, R373, R383
C093, C103, C113, C123, C133, C143, C153, C163, C173, C183, C193

U024
Q014, Q024, Q034, Q044, Q054, Q064, Q074, Q084
D014, D034
S4
R134, R144, R154, R164, R174, R184, R194, R204, R214, R224, R234, R244, R254,
R264, R274, R284, R294, R304, R314, R324, R334, R344, R354, R364, R374, R384
C094, C104, C114, C124, C134, C144, C154, C164, C174, C184, C194

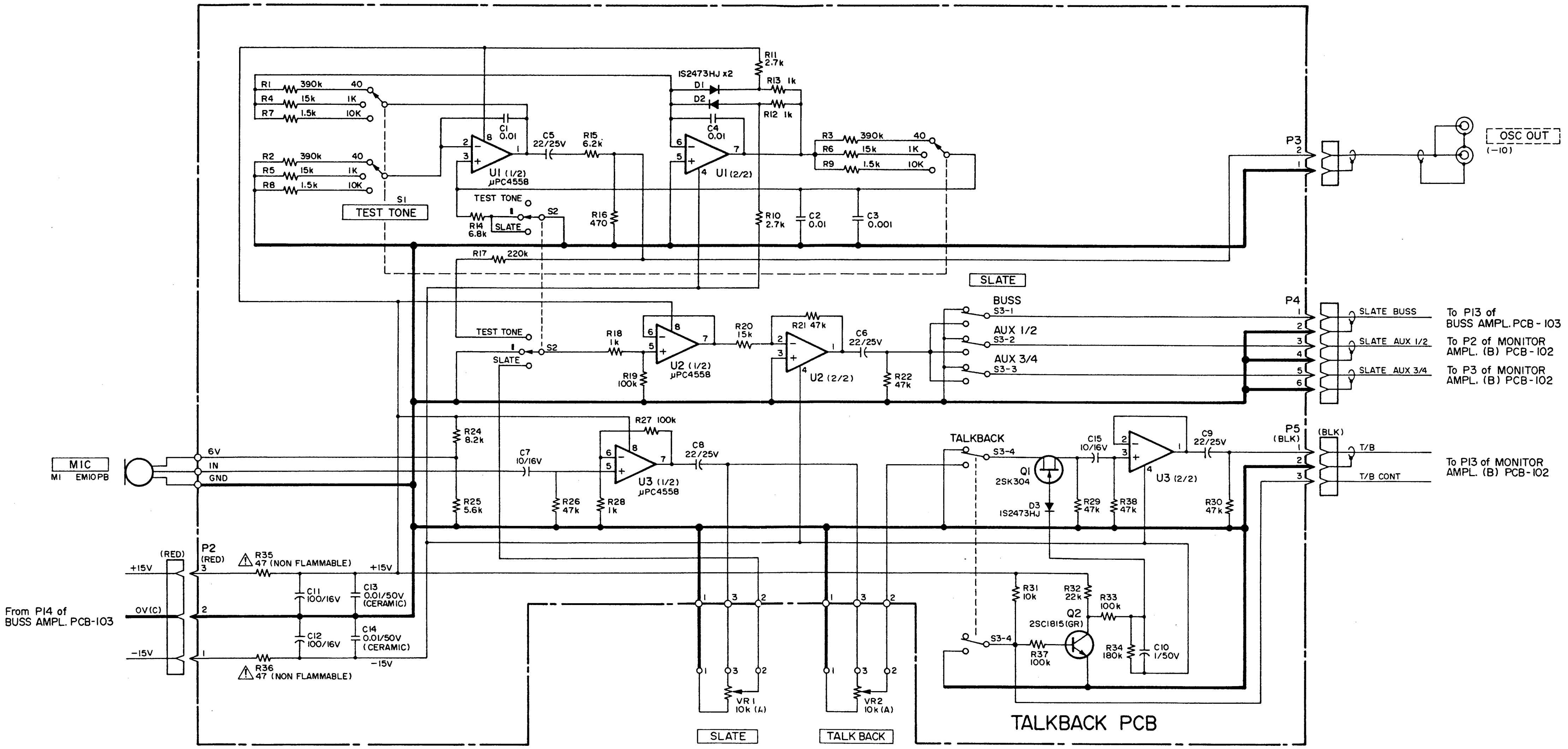
U025
Q015, Q025, Q035, Q045, Q055, Q065, Q075, Q085
D015, D035
S5
R135, R145, R155, R165, R175, R185, R195, R205, R215, R225, R235, R245, R255,
R265, R275, R285, R295, R305, R315, R325, R335, R345, R355, R365, R375, R385
C095, C105, C115, C125, C135, C145, C155, C165, C175, C185, C195

U026
Q016, Q026, Q036, Q046, Q056, Q066, Q076, Q086
D016, D036
S6
R136, R146, R156, R166, R176, R186, R196, R206, R216, R226, R236, R246, R256,
R266, R276, R286, R296, R306, R316, R326, R336, R346, R356, R366, R376, R386
C096, C106, C116, C126, C136, C146, C156, C166, C176, C186, C196

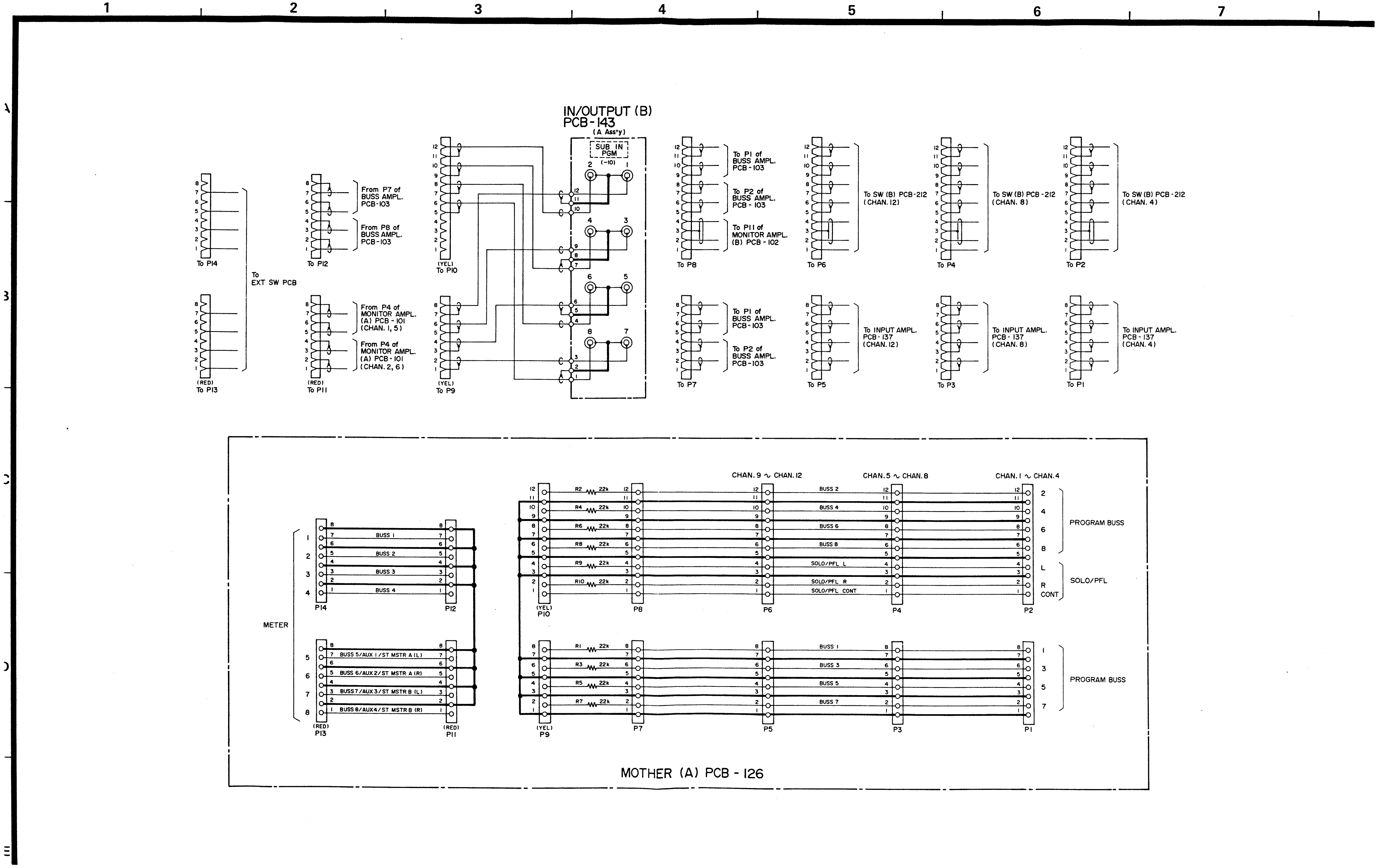
U027
Q017, Q027, Q037, Q047, Q057, Q067, Q077, Q087
D017, D037
S7
R137, R147, R157, R167, R177, R187, R197, R207, R217, R227, R237, R247, R257,
R267, R277, R287, R297, R307, R317, R327, R337, R347, R357, R367, R377, R387
C097, C107, C117, C127, C137, C147, C157, C167, C177, C187, C197

U028
Q018, Q028, Q038, Q048, Q058, Q068, Q078, Q088
D018, D038
S8
R138, R148, R158, R168, R178, R188, R198, R208, R218, R228, R238, R248, R258,
R268, R278, R288, R298, R308, R318, R328, R338, R348, R358, R368, R378, R388
C098, C108, C118, C128, C138, C148, C158, C168, C178, C188, C198

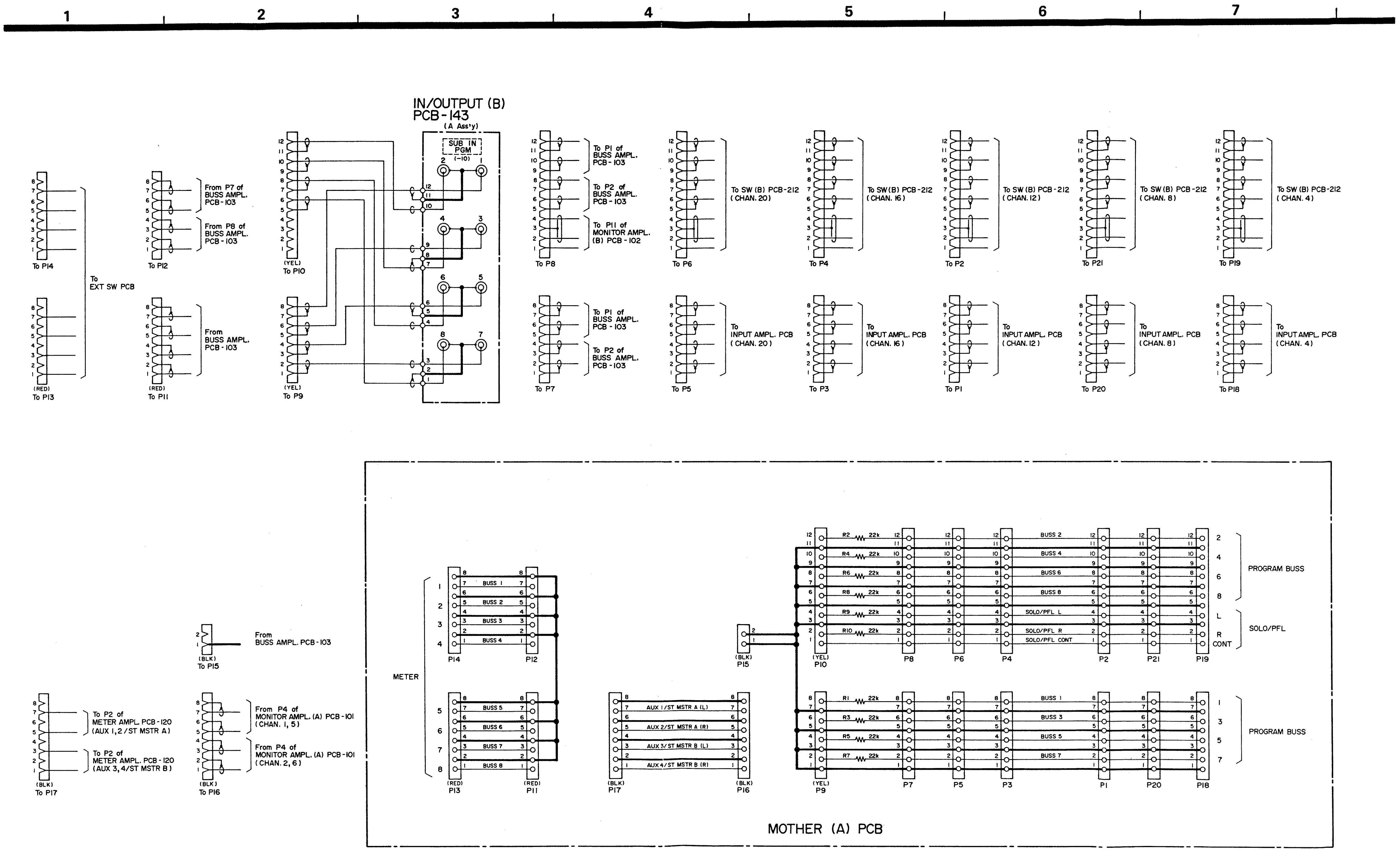
Talkback PCB


R1 390k 40
R4 15k 1K
R7 1.5k 10K
R2 390k 40
R5 15k 1K
R8 1.5k 10K
S1
TEST TONE
C1 0.01
C5 22/25V
R15 6.2k
U1 (1/2) μPC4558
TEST TONE
S2
R14 6.8k
SLATE
R16 470
R17 220k
R11 2.7k
1S2473HJ x2
D1
D2
R13 1k
R12 1k
C4 0.01
U1 (2/2)
R3 390k 40
R6 15k 1K
R9 1.5k 10K
R10 2.7k
C2 0.01
C3 0.001
P3
OSC OUT
(−10)
SLATE
BUSS
S3-1
AUX 1/2
S3-2
AUX 3/4
S3-3
P4
SLATE BUSS
SLATE AUX 1/2
SLATE AUX 3/4
To P13 of BUSS AMPL. PCB-103
To P2 of MONITOR AMPL. (B) PCB-102
To P3 of MONITOR AMPL. (B) PCB-102
TEST TONE
S2
SLATE
R18 1k
R19 100k
U2 (1/2) μPC4558
R20 15k
R21 47k
C6 22/25V
U2 (2/2)
R22 47k
MIC
M1 EM10PB
6V
IN
GND
R24 8.2k
R25 5.6k
C7 10/16V
R26 47k
R28 1k
R27 100k
U3 (1/2) μPC4558
C8 22/25V
TALKBACK
S3-4
Q1 2SK304
D3 1S2473HJ
C15 10/16V
R29 47k
R38 47k
U3 (2/2)
C9 22/25V
R30 47k
P5 (BLK)
(BLK)
T/B
T/B CONT
To P13 of MONITOR AMPL. (B) PCB-102
From P14 of BUSS AMPL. PCB-103
(RED)
P2 (RED)
+15V
0V(C)
−15V
R35 47 (NON FLAMMABLE)
R36 47 (NON FLAMMABLE)
C11 100/16V
C12 100/16V
C13 0.01/50V (CERAMIC)
C14 0.01/50V (CERAMIC)
VR1 10k (A)
VR2 10k (A)
SLATE
TALK BACK
R31 10k
R32 22k
R33 100k
Q2 2SC1815(GR)
S3-4
R37 100k
R34 180k
C10 1/50V
TALKBACK PCB

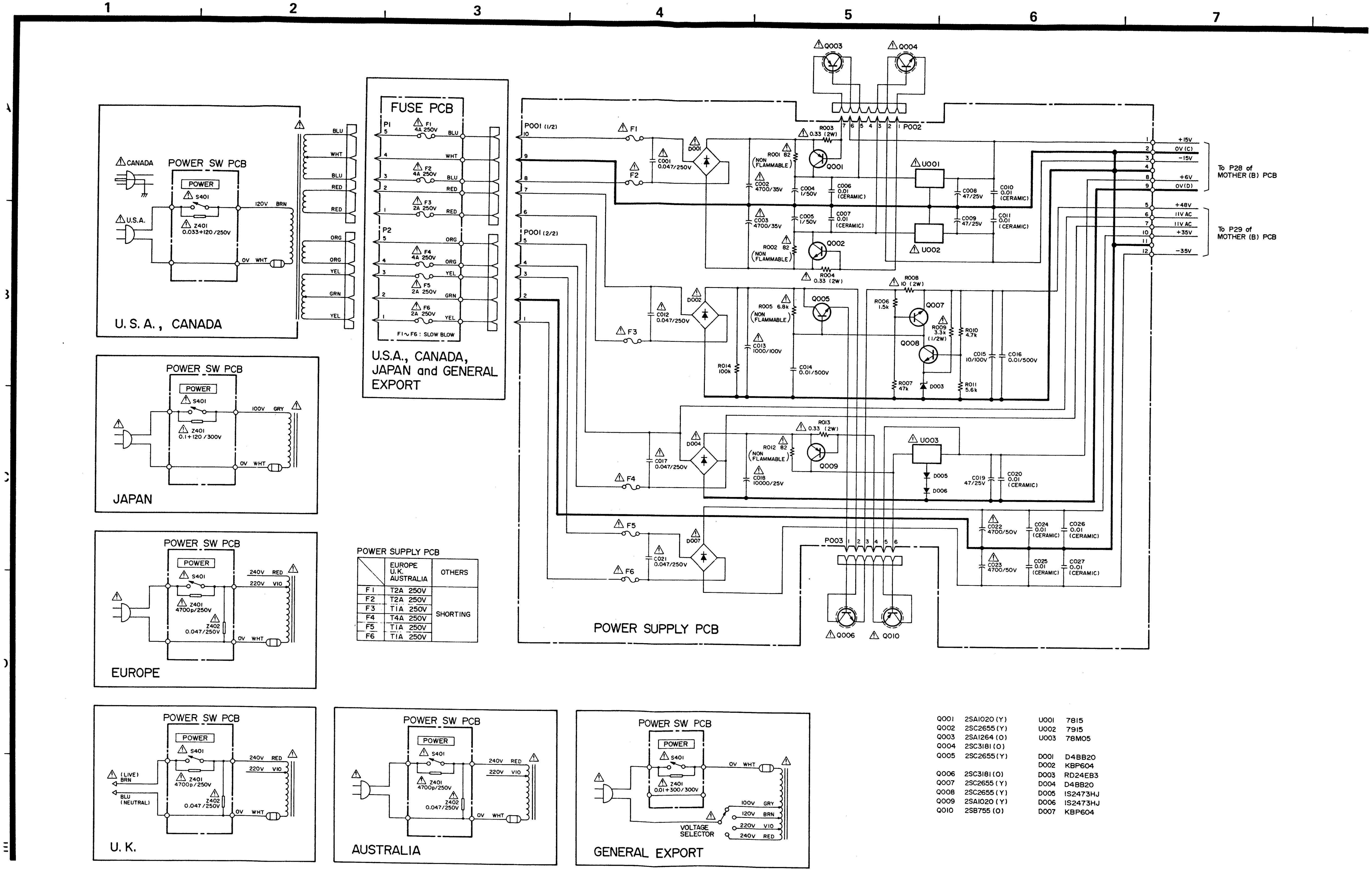
4-3. Mother (A) PCB [M-512]


IN/OUTPUT (B) PCB-143
(A Ass'y)
SUB IN PGM (-10)
To P14
To P13
(RED)
To EXT SW PCB
To P12
To P11
(RED)
From P7 of BUSS AMPL. PCB-103
From P8 of BUSS AMPL. PCB-103
From P4 of MONITOR AMPL. (A) PCB-101 (CHAN. 1, 5)
From P4 of MONITOR AMPL. (A) PCB-101 (CHAN. 2, 6)
(YEL) To P10
(YEL) To P9
To P1 of BUSS AMPL. PCB-103
To P2 of BUSS AMPL. PCB-103
To P11 of MONITOR AMPL. (B) PCB-102
To P8
To P7
To SW (B) PCB-212 (CHAN. 12)
To SW (B) PCB-212 (CHAN. 8)
To SW (B) PCB-212 (CHAN. 4)
To INPUT AMPL. PCB-137 (CHAN. 12)
To INPUT AMPL. PCB-137 (CHAN. 8)
To INPUT AMPL. PCB-137 (CHAN. 4)
To P6
To P5
To P4
To P3
To P2
To P1
CHAN. 9 ∿ CHAN. 12
CHAN. 5 ∿ CHAN. 8
CHAN. 1 ∿ CHAN. 4
METER
BUSS 1
BUSS 2
BUSS 3
BUSS 4
BUSS 5/AUX 1/ST MSTR A (L)
BUSS 6/AUX 2/ST MSTR A (R)
BUSS7/AUX3/ST MSTR B (L)
BUSS 8/AUX4/ST MSTR B (R)
P14
P12
P13
P11
R2 22k
R4 22k
R6 22k
R8 22k
R9 22k
R10 22k
R1 22k
R3 22k
R5 22k
R7 22k
BUSS 2
BUSS 4
BUSS 6
BUSS 8
SOLO/PFL L
SOLO/PFL R
SOLO/PFL CONT
BUSS 1
BUSS 3
BUSS 5
BUSS 7
PROGRAM BUSS
SOLO/PFL
L
R
CONT
PROGRAM BUSS
P10
P8
P6
P4
P2
P9
P7
P5
P3
P1
MOTHER (A) PCB - 126

Mother (A) PCB [M-520]


1
2
3
4
5
6
7
IN/OUTPUT (B) PCB-143
(A Ass'y)
SUB IN PGM (-10)
To P14
To EXT SW PCB
(RED) To P13
From P7 of BUSS AMPL. PCB-103
From P8 of BUSS AMPL. PCB-103
To P12
From BUSS AMPL. PCB-103
(RED) To P11
(YEL) To P10
(YEL) To P9
To P1 of BUSS AMPL. PCB-103
To P2 of BUSS AMPL. PCB-103
To P11 of MONITOR AMPL. (B) PCB-102
To P8
To P1 of BUSS AMPL. PCB-103
To P2 of BUSS AMPL. PCB-103
To P7
To SW (B) PCB-212 (CHAN. 20)
To P6
To INPUT AMPL. PCB (CHAN. 20)
To P5
To SW (B) PCB-212 (CHAN. 16)
To P4
To INPUT AMPL. PCB (CHAN. 16)
To P3
To SW (B) PCB-212 (CHAN. 12)
To P2
To INPUT AMPL. PCB (CHAN. 12)
To P1
To SW (B) PCB-212 (CHAN. 8)
To P21
To INPUT AMPL. PCB (CHAN. 8)
To P20
To SW (B) PCB-212 (CHAN. 4)
To P19
To INPUT AMPL. PCB (CHAN. 4)
To P18
From BUSS AMPL. PCB-103
(BLK) To P15
To P2 of METER AMPL. PCB-120 (AUX 1, 2/ST MSTR A)
To P2 of METER AMPL. PCB-120 (AUX 3, 4/ST MSTR B)
(BLK) To P17
From P4 of MONITOR AMPL. (A) PCB-101 (CHAN. 1, 5)
From P4 of MONITOR AMPL. (A) PCB-101 (CHAN. 2, 6)
(BLK) To P16
METER
BUSS 1
BUSS 2
BUSS 3
BUSS 4
P14
P12
BUSS 5
BUSS 6
BUSS 7
BUSS 8
(RED) P13
(RED) P11
AUX 1/ST MSTR A (L)
AUX 2/ST MSTR A (R)
AUX 3/ST MSTR B (L)
AUX 4/ST MSTR B (R)
(BLK) P17
(BLK) P16
(BLK) P15
R2 22k
R4 22k
R6 22k
R8 22k
R9 22k
R10 22k
BUSS 2
BUSS 4
BUSS 6
BUSS 8
SOLO/PFL L
SOLO/PFL R
SOLO/PFL CONT
(YEL) P10
P8
P6
P4
P2
P21
P19
2
4
6
8
L
R
CONT
PROGRAM BUSS
SOLO/PFL
R1 22k
R3 22k
R5 22k
R7 22k
BUSS 1
BUSS 3
BUSS 5
BUSS 7
(YEL) P9
P7
P5
P3
P1
P20
P18
1
3
5
7
PROGRAM BUSS
MOTHER (A) PCB

4-5. Power Supply PCB [M-512]

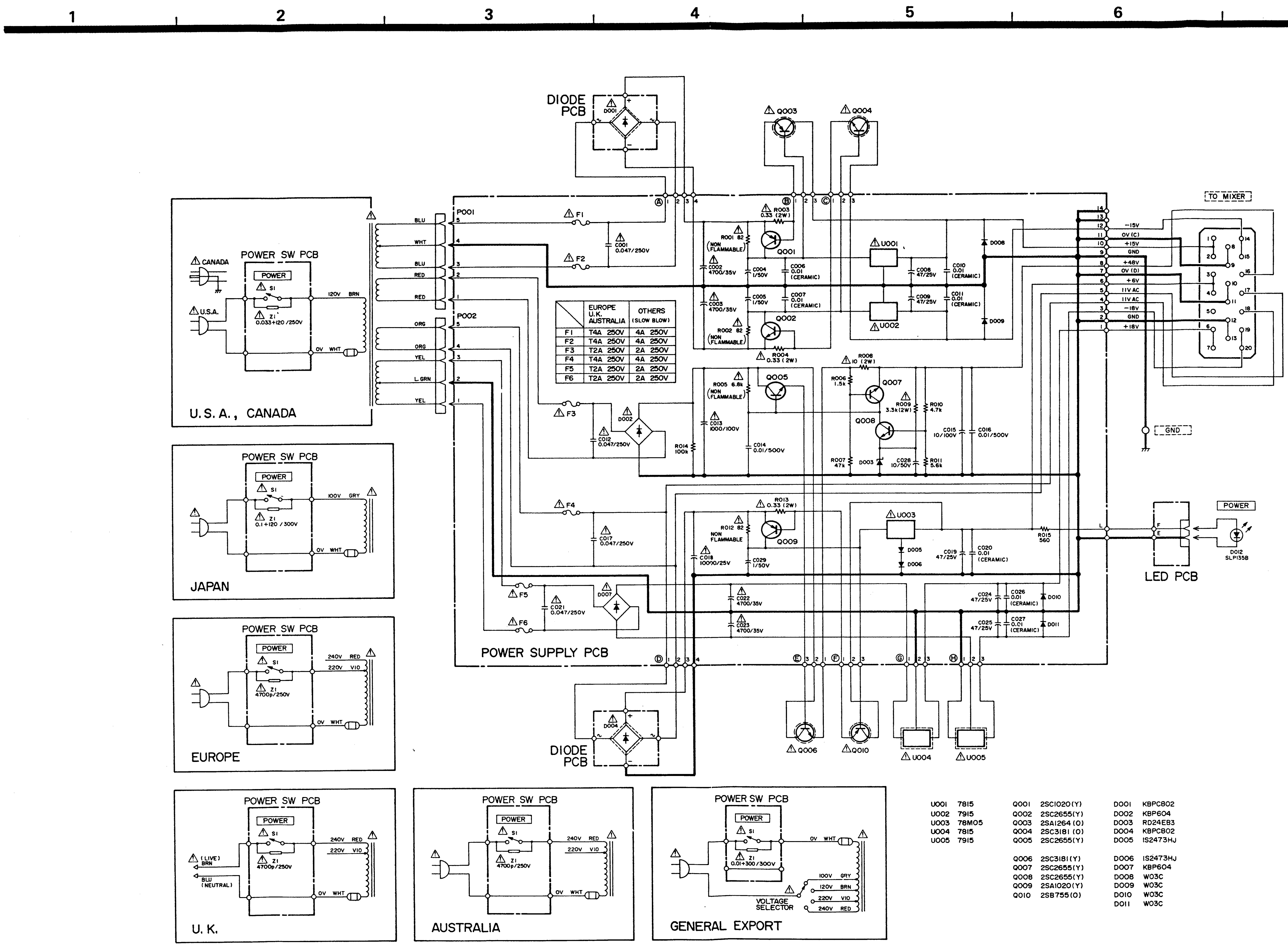

1
2
3
4
5
6
7
U. S. A., CANADA
CANADA
U.S.A.
POWER SW PCB
POWER
S401
Z401
0.033+120/250V
120V BRN
0V WHT
BLU
WHT
BLU
RED
RED
ORG
ORG
YEL
GRN
YEL
FUSE PCB
P1
P2
F1 4A 250V
F2 4A 250V
F3 2A 250V
F4 4A 250V
F5 2A 250V
F6 2A 250V
F1~F6 : SLOW BLOW
U.S.A., CANADA, JAPAN and GENERAL EXPORT
JAPAN
Z401
0.1+120/300V
100V GRY
EUROPE
240V RED
220V VIO
Z401
4700p/250V
Z402
0.047/250V
U. K.
(LIVE) BRN
BLU (NEUTRAL)
AUSTRALIA
GENERAL EXPORT
0.01+300/300V
100V GRY
120V BRN
220V VIO
240V RED
VOLTAGE SELECTOR
P001 (1/2)
P001 (2/2)
P002
P003
F1
F2
F3
F4
F5
F6
C001 0.047/250V
D001
R001 82 (NON FLAMMABLE)
R003 0.33 (2W)
Q001
Q002
Q003
Q004
C002 4700/35V
C003 4700/35V
C004 1/50V
C005 1/50V
C006 0.01 (CERAMIC)
C007 0.01 (CERAMIC)
R002 82 (NON FLAMMABLE)
R004 0.33 (2W)
U001
U002
C008 47/25V
C009 47/25V
C010 0.01 (CERAMIC)
C011 0.01 (CERAMIC)
C012 0.047/250V
D002
R005 6.8k (NON FLAMMABLE)
Q005
C013 1000/100V
R014 100k
C014 0.01/500V
R006 1.5k
R008 10 (2W)
Q007
R009 3.3k (1/2W)
R010 4.7k
Q008
C015 10/100V
C016 0.01/500V
R007 47k
D003
R011 5.6k
C017 0.047/250V
D004
R012 82 (NON FLAMMABLE)
R013 0.33 (2W)
Q009
C018 10000/25V
U003
D005
D006
C019 47/25V
C020 0.01 (CERAMIC)
C021 0.047/250V
D007
C022 4700/50V
C023 4700/50V
C024 0.01 (CERAMIC)
C025 0.01 (CERAMIC)
C026 0.01 (CERAMIC)
C027 0.01 (CERAMIC)
Q006
Q010
POWER SUPPLY PCB
+15V
0V (C)
-15V
+6V
0V (D)
+48V
11V AC
11V AC
+35V
-35V
To P28 of MOTHER (B) PCB
To P29 of MOTHER (B) PCB

POWER SUPPLY PCB

	EUROPE U.K. AUSTRALIA	OTHERS
F1	T2A 250V	SHORTING
F2	T2A 250V	
F3	T1A 250V	
F4	T4A 250V	
F5	T1A 250V	
F6	T1A 250V	

Q001	2SA1020 (Y)	U001	7815
Q002	2SC2655 (Y)	U002	7915
Q003	2SA1264 (O)	U003	78M05
Q004	2SC3181 (O)		
Q005	2SC2655 (Y)	D001	D4BB20
		D002	KBP604
Q006	2SC3181 (O)	D003	RD24EB3
Q007	2SC2655 (Y)	D004	D4BB20
Q008	2SC2655 (Y)	D005	1S2473HJ
Q009	2SA1020 (Y)	D006	1S2473HJ
Q010	2SB755 (O)	D007	KBP604

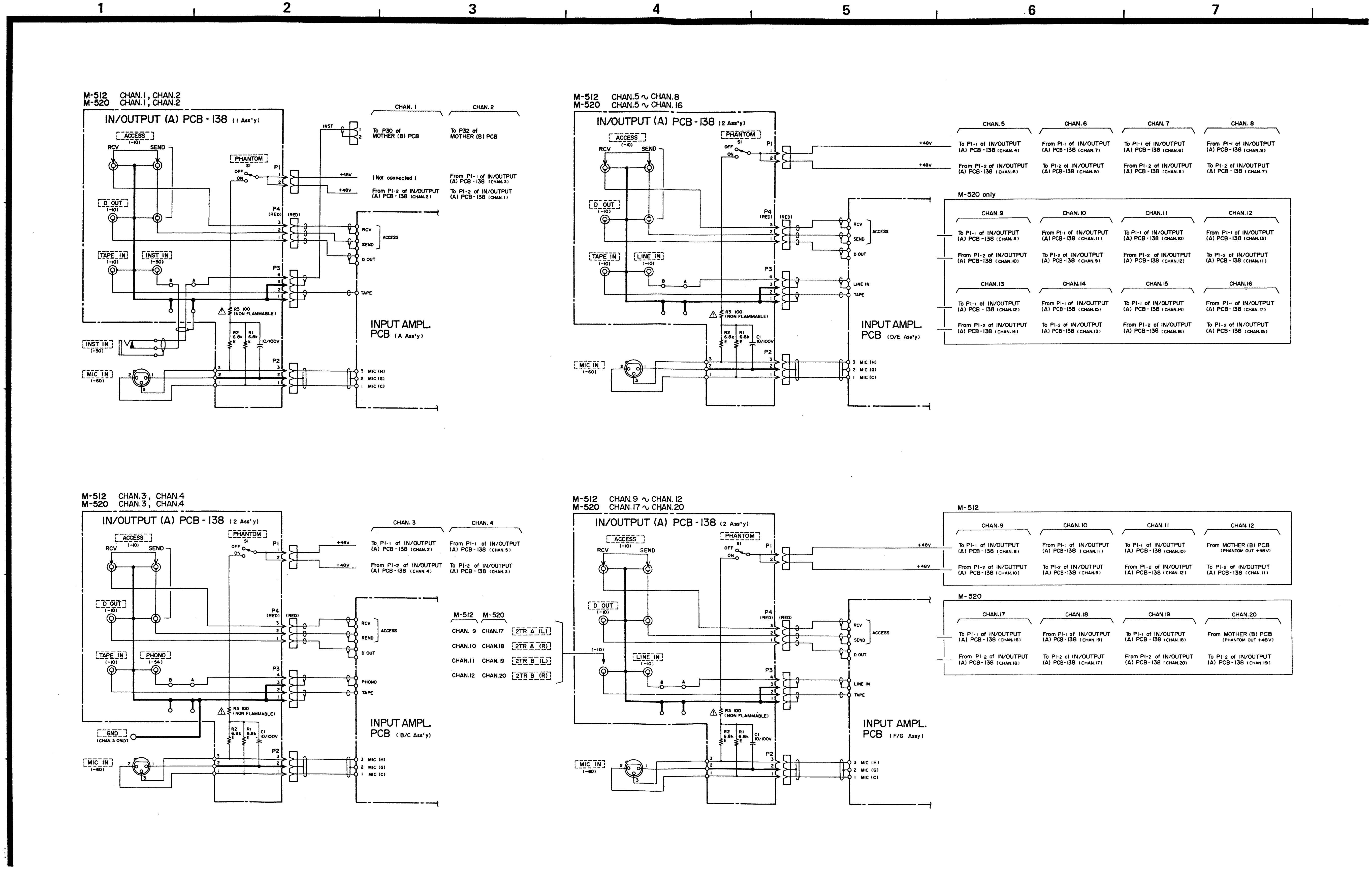
Power Supply Unit [M-520]


1
2
3
4
5
6
7
DIODE PCB
D001
Q003
Q004
P001
P002
BLU
WHT
BLU
RED
RED
ORG
ORG
YEL
L.GRN
YEL
F1
F2
F3
F4
F5
F6
C001 0.047/250V
C012 0.047/250V
C017 0.047/250V
C021 0.047/250V
D002
D007
R001 82 (NON FLAMMABLE)
R002 82 (NON FLAMMABLE)
R003 0.33 (2W)
R004 0.33 (2W)
R005 6.8k (NON FLAMMABLE)
R006 1.5k
R007 47k
R008 10 (2W)
R009 3.3k (2W)
R010 4.7k
R011 5.6k
R012 82 NON FLAMMABLE
R013 0.33 (2W)
R014 100k
R015 560
C002 4700/35V
C003 4700/35V
C004 1/50V
C005 1/50V
C006 0.01 (CERAMIC)
C007 0.01 (CERAMIC)
C008 47/25V
C009 47/25V
C010 0.01 (CERAMIC)
C011 0.01 (CERAMIC)
C013 1000/100V
C014 0.01/500V
C015 10/100V
C016 0.01/500V
C018 1000/25V
C019 47/25V
C020 0.01 (CERAMIC)
C022 4700/35V
C023 4700/35V
C024 47/25V
C025 47/25V
C026 0.01 (CERAMIC)
C027 0.01 (CERAMIC)
C028 10/50V
C029 1/50V
Q001
Q002
Q005
Q007
Q008
Q009
U001
U002
U003
D003
D005
D006
D008
D009
D010
D011
TO MIXER
−15V
0V (C)
+15V
GND
+48V
0V (D)
+6V
11V AC
11V AC
−18V
GND
+18V
GND
POWER
D012 SLP1358
LED PCB
POWER SUPPLY PCB
D004
Q006
Q010
U004
U005
U.S.A., CANADA
POWER SW PCB
POWER
S1
Z1 0.033+120/250V
CANADA
U.S.A.
120V BRN
0V WHT
JAPAN
Z1 0.1+120/300V
100V GRY
EUROPE
Z1 4700p/250V
240V RED
220V VIO
U.K.
(LIVE) BRN
BLU (NEUTRAL)
AUSTRALIA
GENERAL EXPORT
Z1 0.01+300/300V
VOLTAGE SELECTOR
120V BRN
220V VIO
240V RED

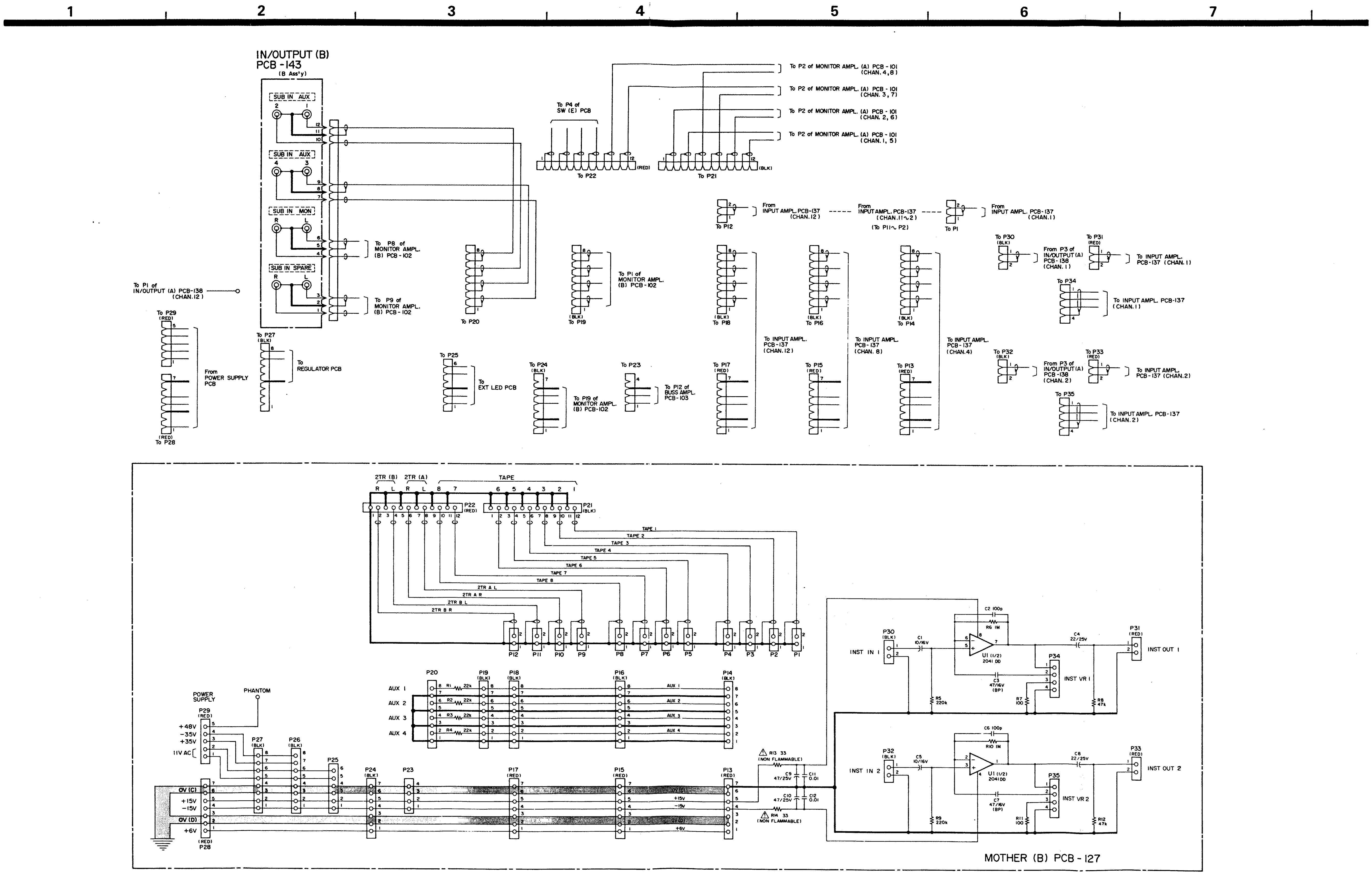
	EUROPE U.K. AUSTRALIA	OTHERS (SLOW BLOW)
F1	T4A 250V	4A 250V
F2	T4A 250V	4A 250V
F3	T2A 250V	2A 250V
F4	T4A 250V	4A 250V
F5	T2A 250V	2A 250V
F6	T2A 250V	2A 250V

U001	7815	Q001	2SC1020(Y)	D001	KBPC802
U002	7915	Q002	2SC2655(Y)	D002	KBP604
U003	78M05	Q003	2SA1264 (O)	D003	RD24EB3
U004	7815	Q004	2SC3181 (O)	D004	KBPC802
U005	7915	Q005	2SC2655(Y)	D005	1S2473HJ
		Q006	2SC3181(Y)	D006	1S2473HJ
		Q007	2SC2655(Y)	D007	KBP604
		Q008	2SC2655(Y)	D008	W03C
		Q009	2SA1020(Y)	D009	W03C
		Q010	2SB755(O)	D010	W03C
				D011	W03C

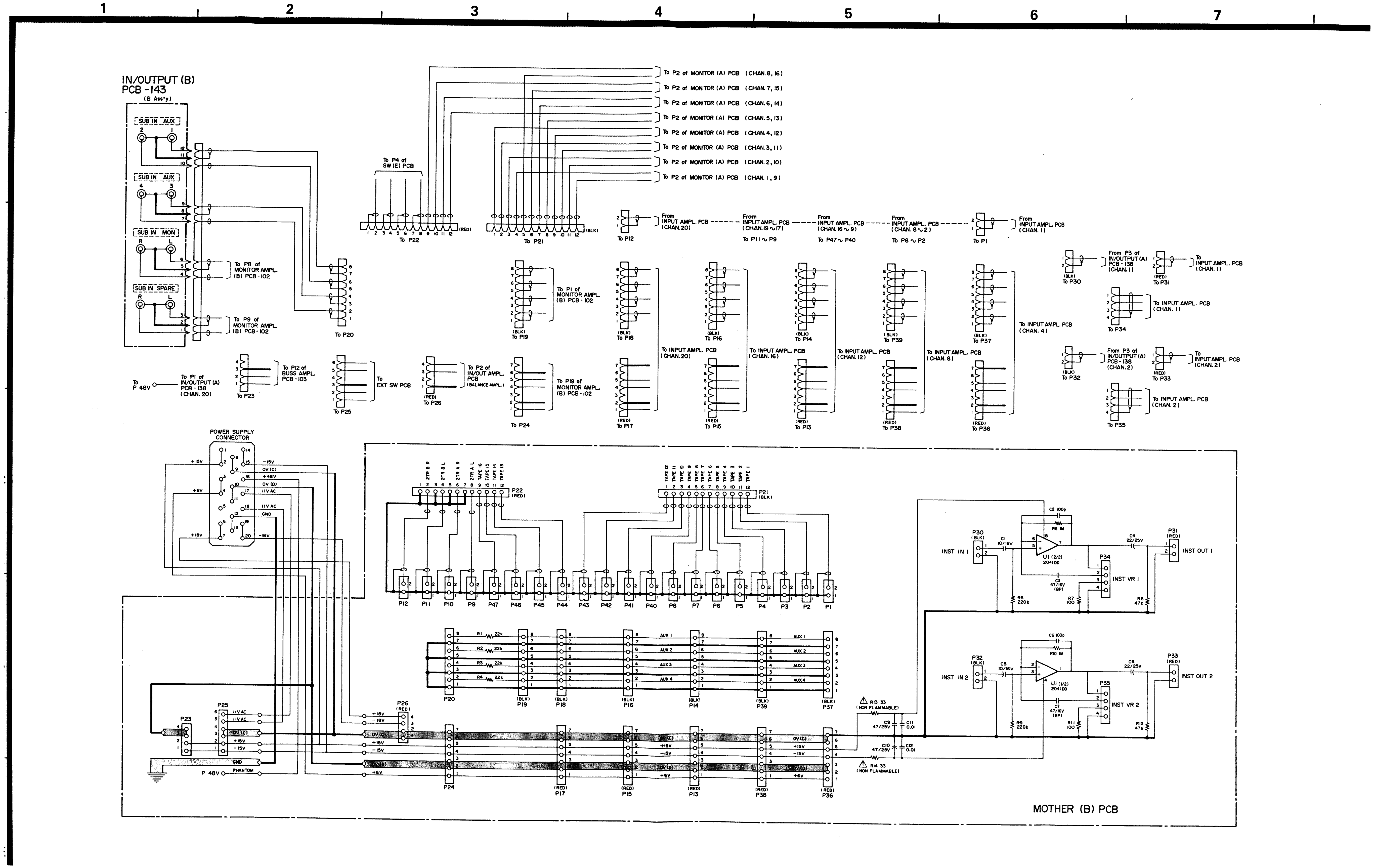
4-7. In/Out (A) PCB


1
2
3
4
5
6
7
M-512 CHAN.1, CHAN.2
M-520 CHAN.1, CHAN.2
IN/OUTPUT (A) PCB-138 (1 Ass'y)
ACCESS (-10)
RCV
SEND
PHANTOM
S1
OFF
ON
P1
D OUT (-10)
TAPE IN (-10)
INST IN (-50)
P4 (RED)
(RED)
P3
B
A
R3 100 (NON FLAMMABLE)
R2 6.8k E
R1 6.8k E
C1 10/100V
P2
INST IN (-50)
MIC IN (-60)
INST
CHAN. 1
CHAN. 2
To P30 of MOTHER (B) PCB
To P32 of MOTHER (B) PCB
+48V
(Not connected)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.3)
+48V
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.2)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.1)
RCV
SEND
ACCESS
D OUT
TAPE
INPUT AMPL. PCB (A Ass'y)
3 MIC (H)
2 MIC (G)
1 MIC (C)
M-512 CHAN.5 ~ CHAN.8
M-520 CHAN.5 ~ CHAN.16
IN/OUTPUT (A) PCB-138 (2 Ass'y)
LINE IN (-10)
LINE IN
INPUT AMPL. PCB (D/E Ass'y)
CHAN.5
CHAN.6
CHAN.7
CHAN.8
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.4)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.7)
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.6)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.9)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.6)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.5)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.8)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.7)
M-520 only
CHAN.9
CHAN.10
CHAN.11
CHAN.12
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.8)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.11)
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.10)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.13)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.10)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.9)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.12)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.11)
CHAN.13
CHAN.14
CHAN.15
CHAN.16
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.12)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.15)
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.14)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.17)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.14)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.13)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.16)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.15)
M-512 CHAN.3, CHAN.4
M-520 CHAN.3, CHAN.4
IN/OUTPUT (A) PCB-138 (2 Ass'y)
PHONO (-54)
GND (CHAN.3 ONLY)
CHAN. 3
CHAN. 4
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.2)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.5)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.4)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.3)
PHONO
INPUT AMPL. PCB (B/C Ass'y)
M-512
M-520
CHAN. 9
CHAN.17
2TR A (L)
CHAN.10
CHAN.18
2TR A (R)
CHAN.11
CHAN.19
2TR B (L)
CHAN.12
CHAN.20
2TR B (R)
M-512 CHAN.9 ~ CHAN.12
M-520 CHAN.17 ~ CHAN.20
IN/OUTPUT (A) PCB-138 (2 Ass'y)
(-10)
INPUT AMPL. PCB (F/G Assy)
M-512
CHAN.9
CHAN.10
CHAN.11
CHAN.12
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.8)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.11)
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.10)
From MOTHER (B) PCB (PHANTOM OUT +48V)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.10)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.9)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.12)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.11)
M-520
CHAN.17
CHAN.18
CHAN.19
CHAN.20
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.16)
From P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.19)
To P1-1 of IN/OUTPUT (A) PCB-138 (CHAN.18)
From MOTHER (B) PCB (PHANTOM OUT +48V)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.18)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.17)
From P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.20)
To P1-2 of IN/OUTPUT (A) PCB-138 (CHAN.19)

Mother (B) PCB [M-512]

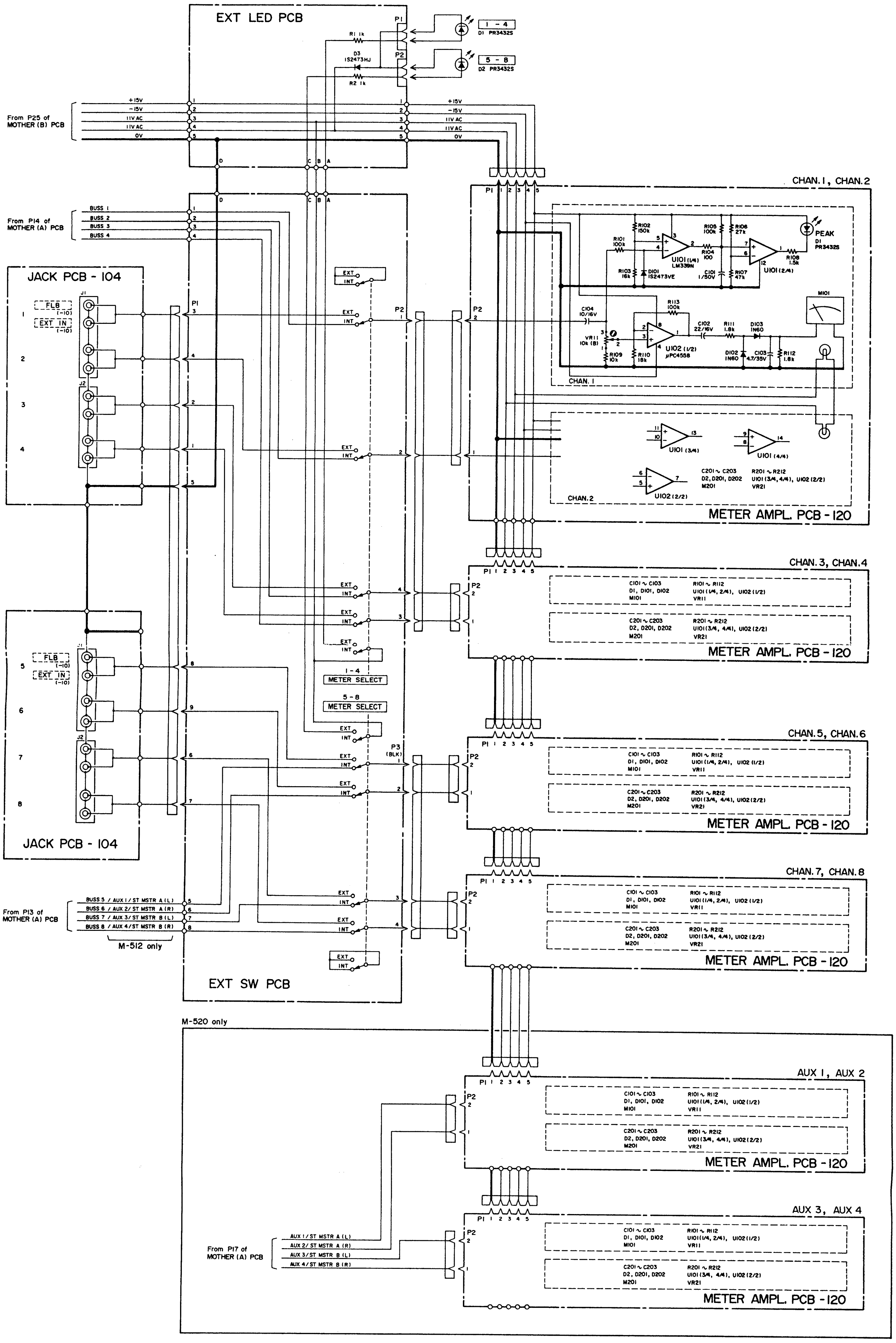

1
2
3
4
5
6
7
IN/OUTPUT (B)
PCB - 143
(B Ass'y)
SUB IN AUX
SUB IN MON
SUB IN SPARE
To P8 of MONITOR AMPL. (B) PCB - 102
To P9 of MONITOR AMPL. (B) PCB - 102
To P1 of IN/OUTPUT (A) PCB-138 (CHAN.12)
To P29 (RED)
(RED) To P28
From POWER SUPPLY PCB
To P27 (BLK)
To REGULATOR PCB
To P20
To P25
To EXT LED PCB
To P24 (BLK)
To P19 of MONITOR AMPL. (B) PCB-102
To P23
To P12 of BUSS AMPL. PCB-103
(BLK) To P19
To P1 of MONITOR AMPL. (B) PCB-102
To P4 of SW (E) PCB
To P22
(RED)
To P21
(BLK)
To P2 of MONITOR AMPL. (A) PCB - 101 (CHAN. 4, 8)
To P2 of MONITOR AMPL. (A) PCB - 101 (CHAN. 3, 7)
To P2 of MONITOR AMPL. (A) PCB - 101 (CHAN. 2, 6)
To P2 of MONITOR AMPL. (A) PCB - 101 (CHAN. 1, 5)
To P12
From INPUT AMPL. PCB-137 (CHAN. 12)
From INPUT AMPL. PCB-137 (CHAN. 11∼2)
(To P11∼ P2)
To P1
From INPUT AMPL. PCB-137 (CHAN. 1)
(BLK) To P18
(BLK) To P16
(BLK) To P14
To INPUT AMPL. PCB-137 (CHAN. 12)
To INPUT AMPL. PCB-137 (CHAN. 8)
To INPUT AMPL. PCB-137 (CHAN. 4)
To P17 (RED)
To P15 (RED)
To P13 (RED)
To P30 (BLK)
From P3 of IN/OUTPUT (A) PCB - 138 (CHAN. 1)
To P31 (RED)
To INPUT AMPL. PCB-137 (CHAN. 1)
To P34
To INPUT AMPL. PCB-137 (CHAN. 1)
To P32 (BLK)
From P3 of IN/OUTPUT (A) PCB - 138 (CHAN. 2)
To P33 (RED)
To INPUT AMPL. PCB-137 (CHAN. 2)
To P35
To INPUT AMPL. PCB-137 (CHAN. 2)
2TR (B)
2TR (A)
TAPE
R L R L 8 7 6 5 4 3 2 1
P22 (RED)
P21 (BLK)
TAPE 1
TAPE 2
TAPE 3
TAPE 4
TAPE 5
TAPE 6
TAPE 7
TAPE 8
2TR A L
2TR A R
2TR B L
2TR B R
P12 P11 P10 P9 P8 P7 P6 P5 P4 P3 P2 P1
P20
P19 (BLK)
P18 (BLK)
P16 (BLK)
P14 (BLK)
AUX 1
AUX 2
AUX 3
AUX 4
R1 22k
R2 22k
R3 22k
R4 22k
POWER SUPPLY
PHANTOM
P29 (RED)
+48V
−35V
+35V
11V AC
P27 (BLK)
P26 (BLK)
P25
P24 (BLK)
P23
P17 (RED)
P15 (RED)
P13 (RED)
0V (C)
+15V
−15V
0V (D)
+6V
(RED) P28
R13 33 (NON FLAMMABLE)
R14 33 (NON FLAMMABLE)
C9 47/25V
C11 0.01
C10 47/25V
C12 0.01
INST IN 1
P30 (BLK)
C1 10/16V
C2 100p
R6 1M
U1 (1/2) 2041 DD
C3 47/16V (BP)
R5 220k
R7 100
P34
INST VR 1
C4 22/25V
R8 47k
P31 (RED)
INST OUT 1
INST IN 2
P32 (BLK)
C5 10/16V
C6 100p
R10 1M
U1 (1/2) 2041DD
C7 47/16V (BP)
R9 220k
R11 100
P35
INST VR 2
C8 22/25V
R12 47k
P33 (RED)
INST OUT 2
MOTHER (B) PCB - 127

4-9. Mother (B) PCB [M-520]



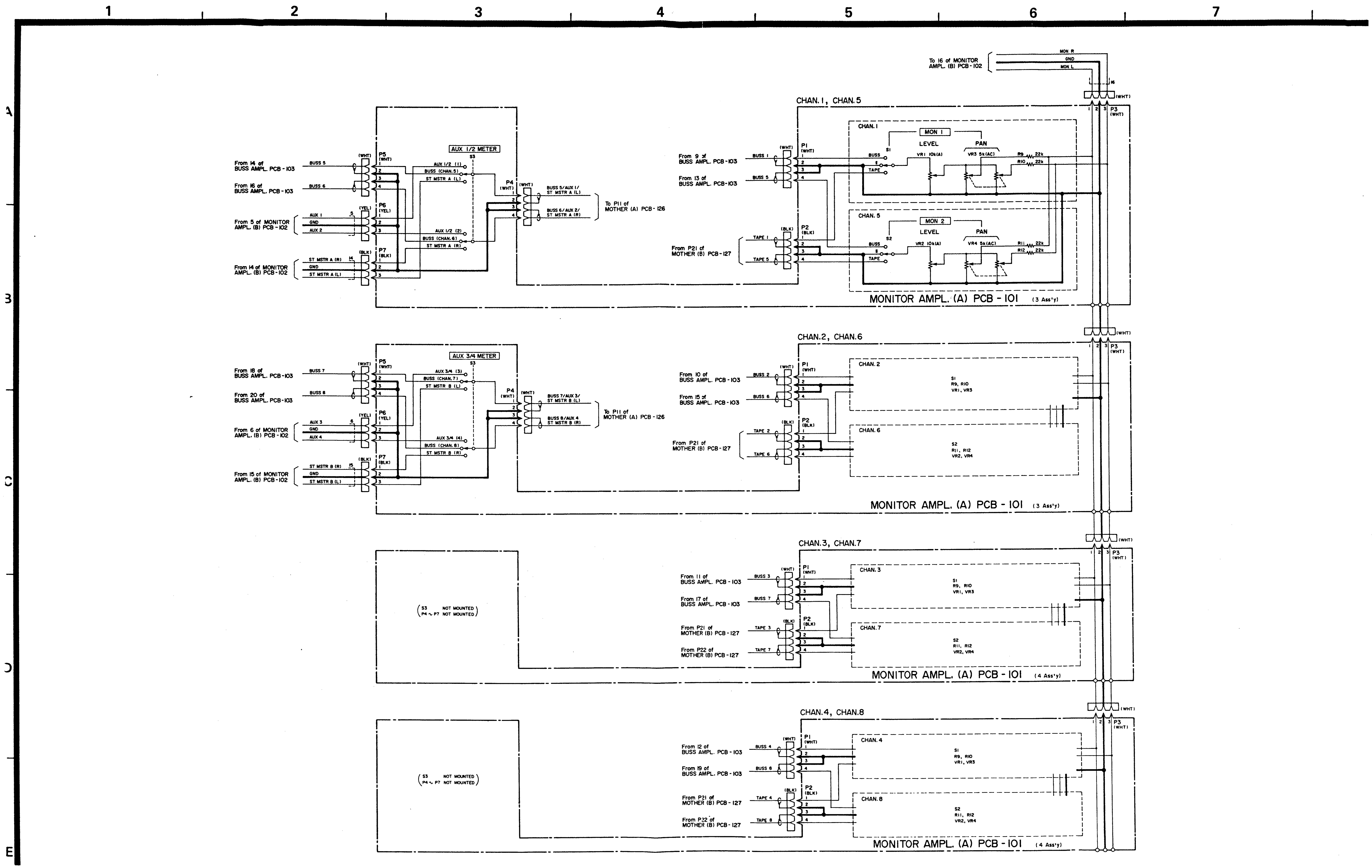
1
2
3
4
5
6
7
IN/OUTPUT (B) PCB -143
(B Ass'y)
SUB IN AUX
SUB IN MON
SUB IN SPARE
To P8 of MONITOR AMPL. (B) PCB - 102
To P9 of MONITOR AMPL. (B) PCB - 102
To P20
To P4 of SW (E) PCB
To P22
To P21
To P2 of MONITOR (A) PCB (CHAN. 8, 16)
To P2 of MONITOR (A) PCB (CHAN. 7, 15)
To P2 of MONITOR (A) PCB (CHAN. 6, 14)
To P2 of MONITOR (A) PCB (CHAN. 5, 13)
To P2 of MONITOR (A) PCB (CHAN. 4, 12)
To P2 of MONITOR (A) PCB (CHAN. 3, 11)
To P2 of MONITOR (A) PCB (CHAN. 2, 10)
To P2 of MONITOR (A) PCB (CHAN. 1, 9)
From INPUT AMPL. PCB (CHAN. 20)
From INPUT AMPL. PCB (CHAN. 19 ~ 17)
From INPUT AMPL. PCB (CHAN. 16 ~ 9)
From INPUT AMPL. PCB (CHAN. 8 ~ 2)
From INPUT AMPL. PCB (CHAN. 1)
To P12
To P11 ~ P9
To P47 ~ P40
To P8 ~ P2
To P1
To P1 of MONITOR AMPL. (B) PCB - 102
To P19
To P18
To P16
To P14
To P39
To P37
To INPUT AMPL. PCB (CHAN. 20)
To INPUT AMPL. PCB (CHAN. 16)
To INPUT AMPL. PCB (CHAN. 12)
To INPUT AMPL. PCB (CHAN. 8)
To INPUT AMPL. PCB (CHAN. 4)
From P3 of IN/OUTPUT (A) PCB - 138 (CHAN. 1)
To P30
To INPUT AMPL. PCB (CHAN. 1)
To P31
To P34
From P3 of IN/OUTPUT (A) PCB - 138 (CHAN. 2)
To P32
To INPUT AMPL. PCB (CHAN. 2)
To P33
To P35
To P12 of BUSS AMPL. PCB - 103
To P1 of IN/OUTPUT (A) PCB - 138 (CHAN. 20)
To P 48V
To P23
To EXT SW PCB
To P25
To P2 of IN/OUT AMPL. PCB (BALANCE AMPL.)
To P26
To P19 of MONITOR AMPL. (B) PCB - 102
To P24
To P17
To P15
To P13
To P38
To P36
(RED)
(BLK)
POWER SUPPLY CONNECTOR
+15V
-15V
0V (C)
+48V
0V (D)
+6V
11V AC
GND
+18V
-18V
2TR B R
2TR B L
2TR A R
2TR A L
TAPE 16
TAPE 15
TAPE 14
TAPE 13
TAPE 12
TAPE 11
TAPE 10
TAPE 9
TAPE 8
TAPE 7
TAPE 6
TAPE 5
TAPE 4
TAPE 3
TAPE 2
TAPE 1
P22
P21
P12
P11
P10
P9
P47
P46
P45
P44
P43
P42
P41
P40
P8
P7
P6
P5
P4
P3
P2
P1
R1 22k
R2 22k
R3 22k
R4 22k
AUX 1
AUX 2
AUX 3
AUX 4
P20
P19
P18
P16
P14
P39
P37
P23
P25
P26
P24
P17
P15
P13
P38
P36
PHANTOM
P 48V
R13 33 (NON FLAMMABLE)
R14 33 (NON FLAMMABLE)
C9 47/25V
C10 47/25V
C11 0.01
C12 0.01
INST IN 1
P30
C1 10/16V
C2 100p
R6 1M
U1 (2/2) 2041DD
C3 47/16V (BP)
R5 220k
R7 100
C4 22/25V
P34
INST VR 1
R8 47k
P31
INST OUT 1
INST IN 2
P32
C5 10/16V
C6 100p
R10 1M
U1 (1/2) 2041DD
C7 47/16V (BP)
R9 220k
R11 100
C8 22/25V
P35
INST VR 2
R12 47k
P33
INST OUT 2
MOTHER (B) PCB

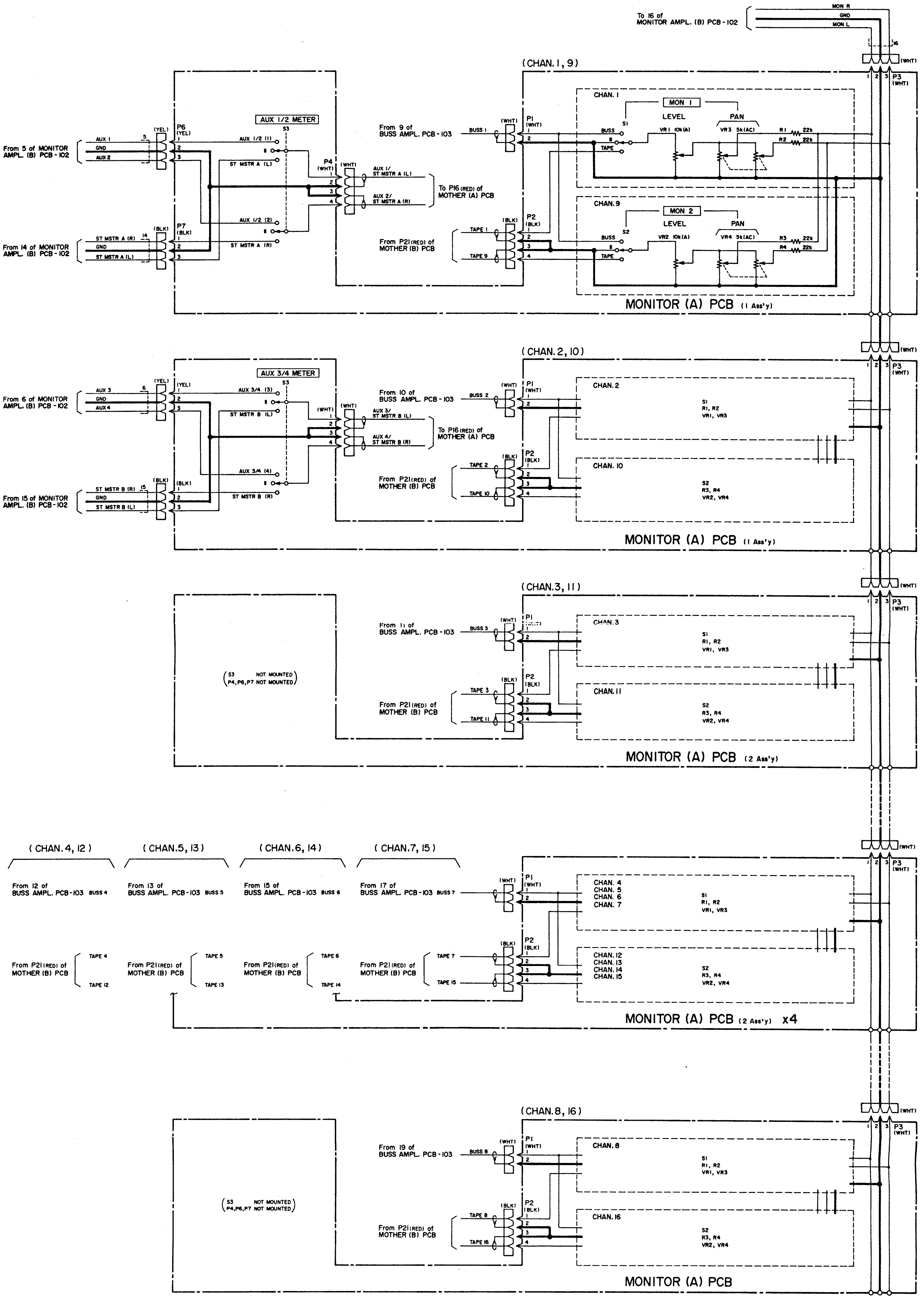
Meter Ampl. PCB/EXT LED PCB/EXT SW PCB



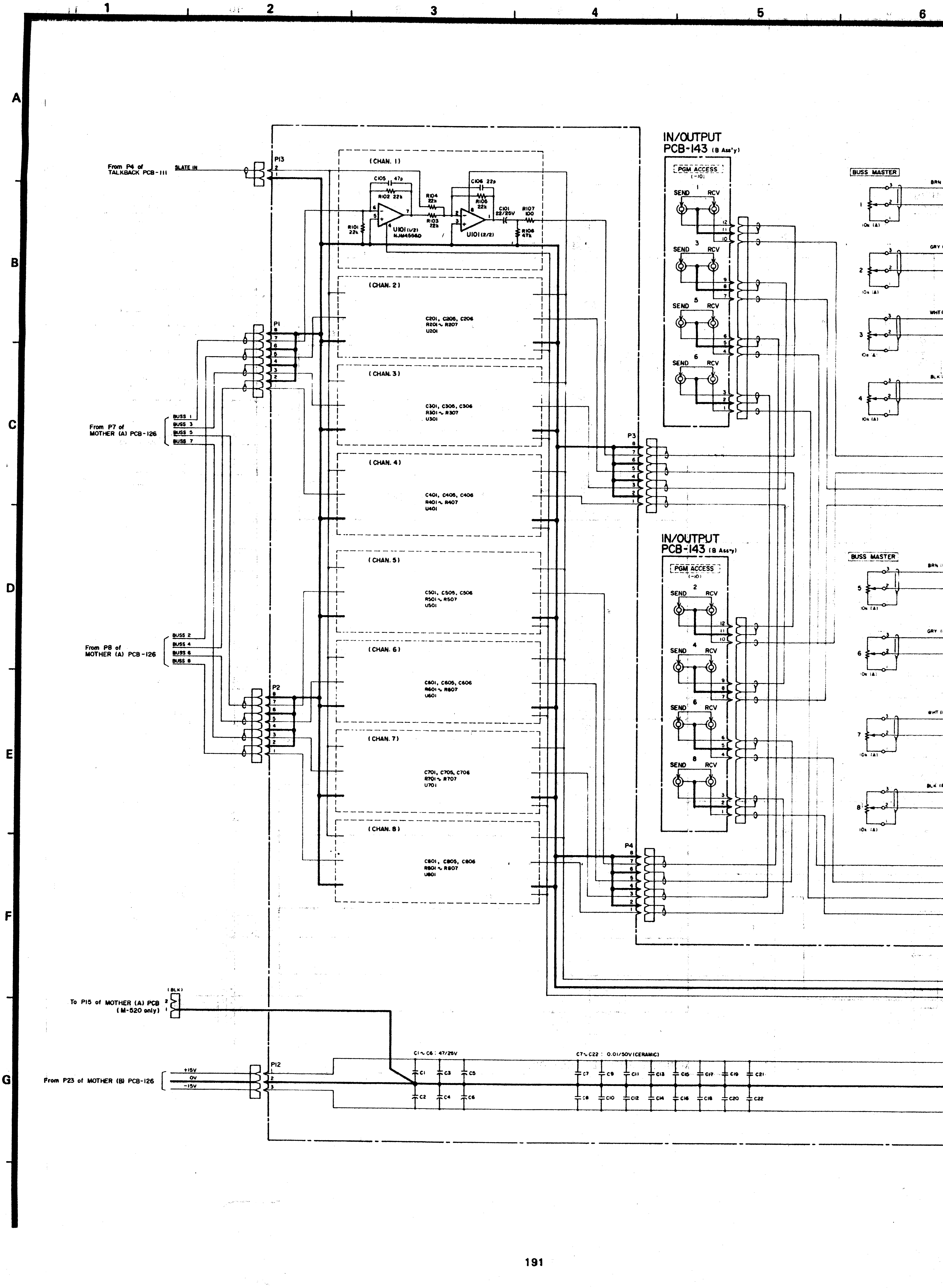
EXT LED PCB
P1
P2
R1 1k
R2 1k
D3 1S2473HJ
1 - 4
D1 PR3432S
5 - 8
D2 PR3432S
+15V
-15V
11V AC
0V
From P25 of MOTHER (B) PCB
From P14 of MOTHER (A) PCB
BUSS 1
BUSS 2
BUSS 3
BUSS 4
JACK PCB - 104
J1
J2
FLB (-10)
EXT IN (-10)
EXT
INT
P3 (BLK)
1 - 4 METER SELECT
5 - 8 METER SELECT
EXT SW PCB
From P13 of MOTHER (A) PCB
BUSS 5 / AUX 1 / ST MSTR A (L)
BUSS 6 / AUX 2 / ST MSTR A (R)
BUSS 7 / AUX 3 / ST MSTR B (L)
BUSS 8 / AUX 4 / ST MSTR B (R)
M-512 only
M-520 only
CHAN. 1, CHAN. 2
R101 100k
R102 150k
R103 18k
D101 1S2473VE
U101 (1/4) LM339N
R104 100
R105 100k
R106 27k
C101 1/50V
R107 47k
R108 1.5k
U101 (2/4)
PEAK
D1 PR3432S
M101
C104 10/16V
VR11 10k (B)
R109 10k
R110 18k
R113 100k
U102 (1/2) µPC4558
C102 22/16V
R111 1.8k
D103 1N60
D102 1N60
C103 4.7/35V
R112 1.8k
CHAN. 1
U101 (3/4)
U101 (4/4)
U102 (2/2)
C201 ~ C203
D2, D201, D202
M201
R201 ~ R212
U101 (3/4, 4/4), U102 (2/2)
VR21
CHAN. 2
METER AMPL. PCB - 120
CHAN. 3, CHAN. 4
CHAN. 5, CHAN. 6
CHAN. 7, CHAN. 8
C101 ~ C103
D1, D101, D102
M101
R101 ~ R112
U101 (1/4, 2/4), U102 (1/2)
VR11
AUX 1, AUX 2
AUX 3, AUX 4
From P17 of MOTHER (A) PCB
AUX 1 / ST MSTR A (L)
AUX 2 / ST MSTR A (R)
AUX 3 / ST MSTR B (L)
AUX 4 / ST MSTR B (R)

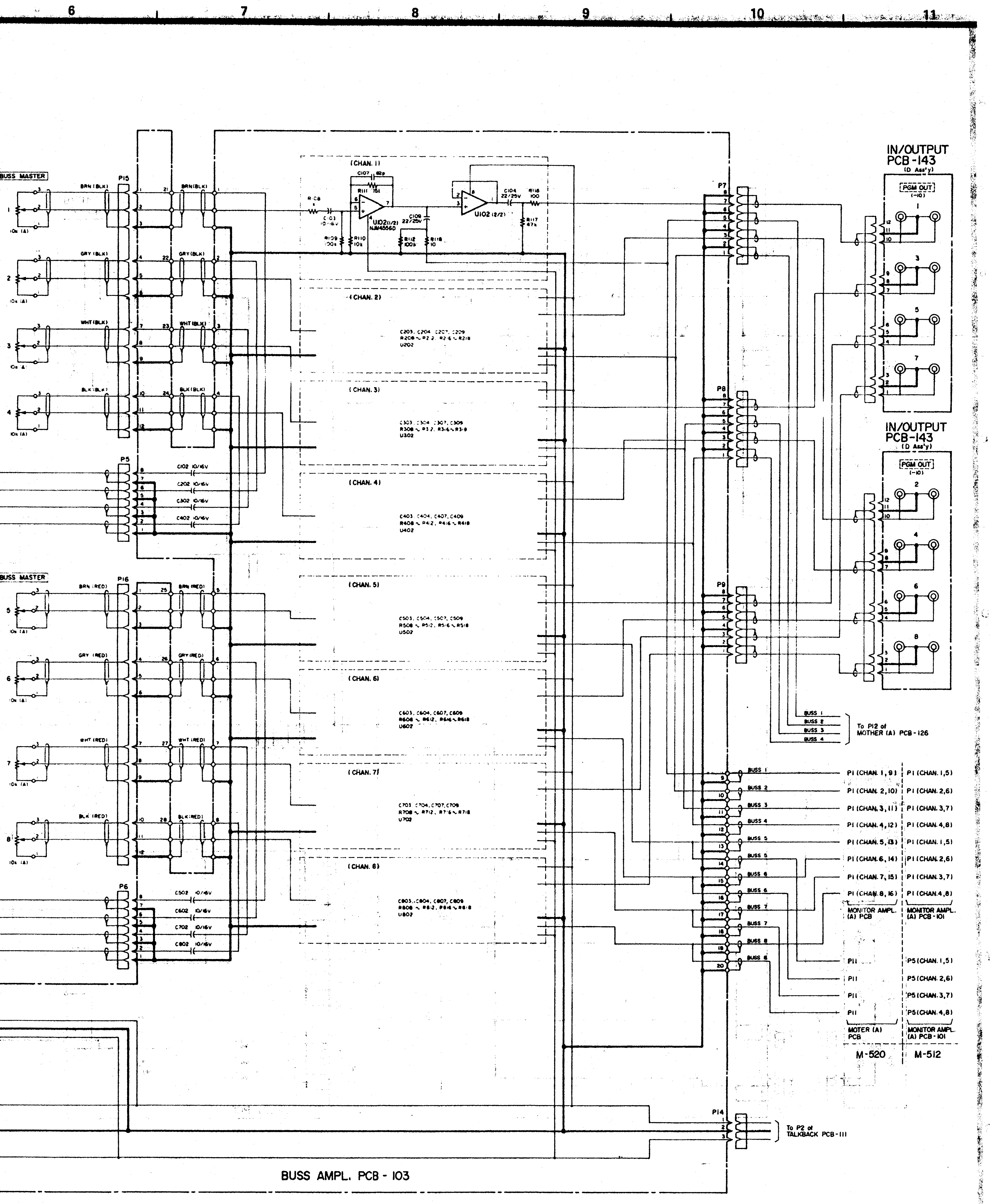
4-11. Monitor Ampl. (A) PCB [M-512]


1
2
3
4
5
6
7
A
B
C
D
E
AUX 1/2 METER
S3
From 14 of BUSS AMPL. PCB - 103
BUSS 5
From 16 of BUSS AMPL. PCB - 103
BUSS 6
From 5 of MONITOR AMPL. (B) PCB - 102
AUX 1
GND
AUX 2
From 14 of MONITOR AMPL. (B) PCB - 102
ST MSTR A (R)
GND
ST MSTR A (L)
P5 (WHT)
P6 (YEL)
P7 (BLK)
AUX 1/2 (1)
BUSS (CHAN. 5)
ST MSTR A (L)
AUX 1/2 (2)
BUSS (CHAN. 6)
ST MSTR A (R)
P4 (WHT)
BUSS 5/AUX 1/ ST MSTR A (L)
BUSS 6/AUX 2/ ST MSTR A (R)
To P11 of MOTHER (A) PCB - 126
To 16 of MONITOR AMPL. (B) PCB - 102
MON R
GND
MON L
CHAN. 1, CHAN. 5
From 9 of BUSS AMPL. PCB - 103
BUSS 1
From 13 of BUSS AMPL. PCB - 103
BUSS 5
From P21 of MOTHER (B) PCB - 127
TAPE 1
TAPE 5
P1 (WHT)
P2 (BLK)
P3 (WHT)
CHAN. 1
MON 1
LEVEL
PAN
S1
BUSS
TAPE
VR1 10k(A)
VR3 5k(AC)
R9 22k
R10 22k
CHAN. 5
MON 2
S2
VR2 10k(A)
VR4 5k(AC)
R11 22k
R12 22k
MONITOR AMPL. (A) PCB - 101 (3 Ass'y)
AUX 3/4 METER
From 18 of BUSS AMPL. PCB - 103
BUSS 7
From 20 of BUSS AMPL. PCB - 103
BUSS 8
From 6 of MONITOR AMPL. (B) PCB - 102
AUX 3
GND
AUX 4
From 15 of MONITOR AMPL. (B) PCB - 102
ST MSTR B (R)
GND
ST MSTR B (L)
AUX 3/4 (3)
BUSS (CHAN. 7)
ST MSTR B (L)
AUX 3/4 (4)
BUSS (CHAN. 8)
ST MSTR B (R)
BUSS 7/AUX 3/ ST MSTR B (L)
BUSS 8/AUX 4 ST MSTR B (R)
To P11 of MOTHER (A) PCB - 126
CHAN. 2, CHAN. 6
From 10 of BUSS AMPL. PCB - 103
BUSS 2
From 15 of BUSS AMPL. PCB - 103
BUSS 6
From P21 of MOTHER (B) PCB - 127
TAPE 2
TAPE 6
CHAN. 2
S1 R9, R10 VR1, VR3
CHAN. 6
S2 R11, R12 VR2, VR4
MONITOR AMPL. (A) PCB - 101 (3 Ass'y)
(S3 NOT MOUNTED P4 ~ P7 NOT MOUNTED)
CHAN. 3, CHAN. 7
From 11 of BUSS AMPL. PCB - 103
BUSS 3
From 17 of BUSS AMPL. PCB - 103
BUSS 7
From P21 of MOTHER (B) PCB - 127
TAPE 3
From P22 of MOTHER (B) PCB - 127
TAPE 7
CHAN. 3
S1 R9, R10 VR1, VR3
CHAN. 7
S2 R11, R12 VR2, VR4
MONITOR AMPL. (A) PCB - 101 (4 Ass'y)
(S3 NOT MOUNTED P4 ~ P7 NOT MOUNTED)
CHAN. 4, CHAN. 8
From 12 of BUSS AMPL. PCB - 103
BUSS 4
From 19 of BUSS AMPL. PCB - 103
BUSS 8
From P21 of MOTHER (B) PCB - 127
TAPE 4
From P22 of MOTHER (B) PCB - 127
TAPE 8
CHAN. 4
S1 R9, R10 VR1, VR3
CHAN. 8
S2 R11, R12 VR2, VR4
MONITOR AMPL. (A) PCB - 101 (4 Ass'y)

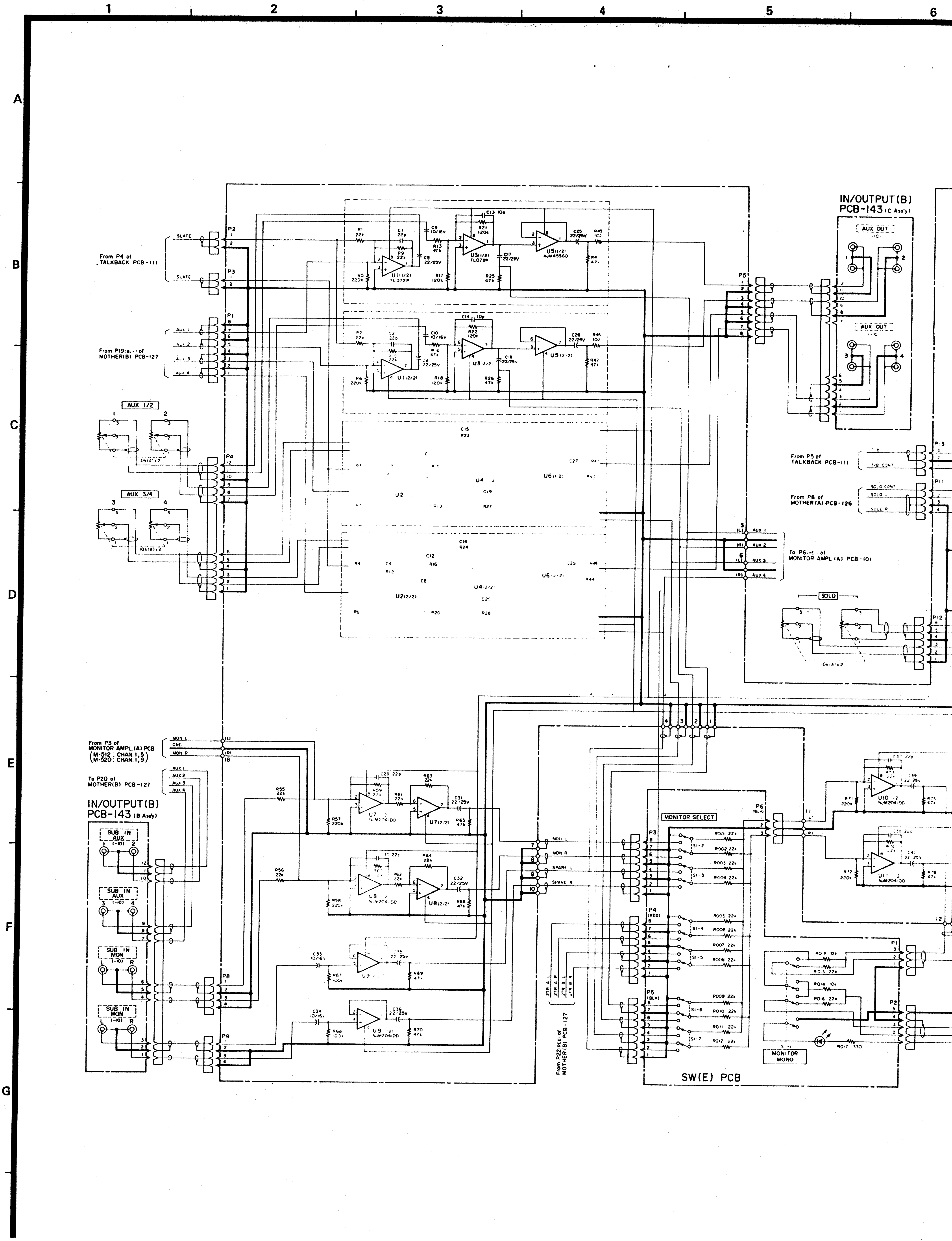

To 16 of MONITOR AMPL. (B) PCB - 102
MON R
GND
MON L
(CHAN. 1, 9)
(CHAN. 2, 10)
(CHAN. 3, 11)
(CHAN. 4, 12)
(CHAN. 5, 13)
(CHAN. 6, 14)
(CHAN. 7, 15)
(CHAN. 8, 16)
AUX 1/2 METER
AUX 3/4 METER
From 5 of MONITOR AMPL. (B) PCB - 102
From 14 of MONITOR AMPL. (B) PCB - 102
From 6 of MONITOR AMPL. (B) PCB - 102
From 15 of MONITOR AMPL. (B) PCB - 102
AUX 1
GND
AUX 2
AUX 3
AUX 4
ST MSTR A (R)
ST MSTR A (L)
ST MSTR B (R)
ST MSTR B (L)
P6 (YEL)
P7 (BLK)
P4 (WHT)
S3
AUX 1/2 (1)
AUX 1/2 (2)
AUX 3/4 (3)
AUX 3/4 (4)
AUX 1/ ST MSTR A (L)
AUX 2/ ST MSTR A (R)
AUX 3/ ST MSTR B (L)
AUX 4/ ST MSTR B (R)
To P16 (RED) of MOTHER (A) PCB
From 9 of BUSS AMPL. PCB - 103
From 10 of BUSS AMPL. PCB - 103
From 11 of BUSS AMPL. PCB - 103
From 12 of BUSS AMPL. PCB - 103
From 13 of BUSS AMPL. PCB - 103
From 15 of BUSS AMPL. PCB - 103
From 17 of BUSS AMPL. PCB - 103
From 19 of BUSS AMPL. PCB - 103
From P21 (RED) of MOTHER (B) PCB
BUSS 1
BUSS 2
BUSS 3
BUSS 4
BUSS 5
BUSS 6
BUSS 7
BUSS 8
TAPE 1
TAPE 9
TAPE 2
TAPE 10
TAPE 3
TAPE 11
TAPE 4
TAPE 12
TAPE 5
TAPE 13
TAPE 6
TAPE 14
TAPE 7
TAPE 15
TAPE 8
TAPE 16
P1 (WHT)
P2 (BLK)
P3 (WHT)
CHAN. 1
CHAN. 9
MON 1
MON 2
LEVEL
PAN
VR1 10k(A)
VR2 10k(A)
VR3 5k(AC)
VR4 5k(AC)
R1 22k
R2 22k
R3 22k
R4 22k
S1
S2
BUSS
TAPE
CHAN. 2
CHAN. 10
CHAN. 3
CHAN. 11
CHAN. 4
CHAN. 5
CHAN. 6
CHAN. 7
CHAN. 12
CHAN. 13
CHAN. 14
CHAN. 15
CHAN. 8
CHAN. 16
S1 R1, R2 VR1, VR3
S2 R3, R4 VR2, VR4
(S3 NOT MOUNTED P4, P6, P7 NOT MOUNTED)
MONITOR (A) PCB (1 Ass'y)
MONITOR (A) PCB (2 Ass'y)
MONITOR (A) PCB (2 Ass'y) x4
MONITOR (A) PCB
1
2
3
4
5
6
7

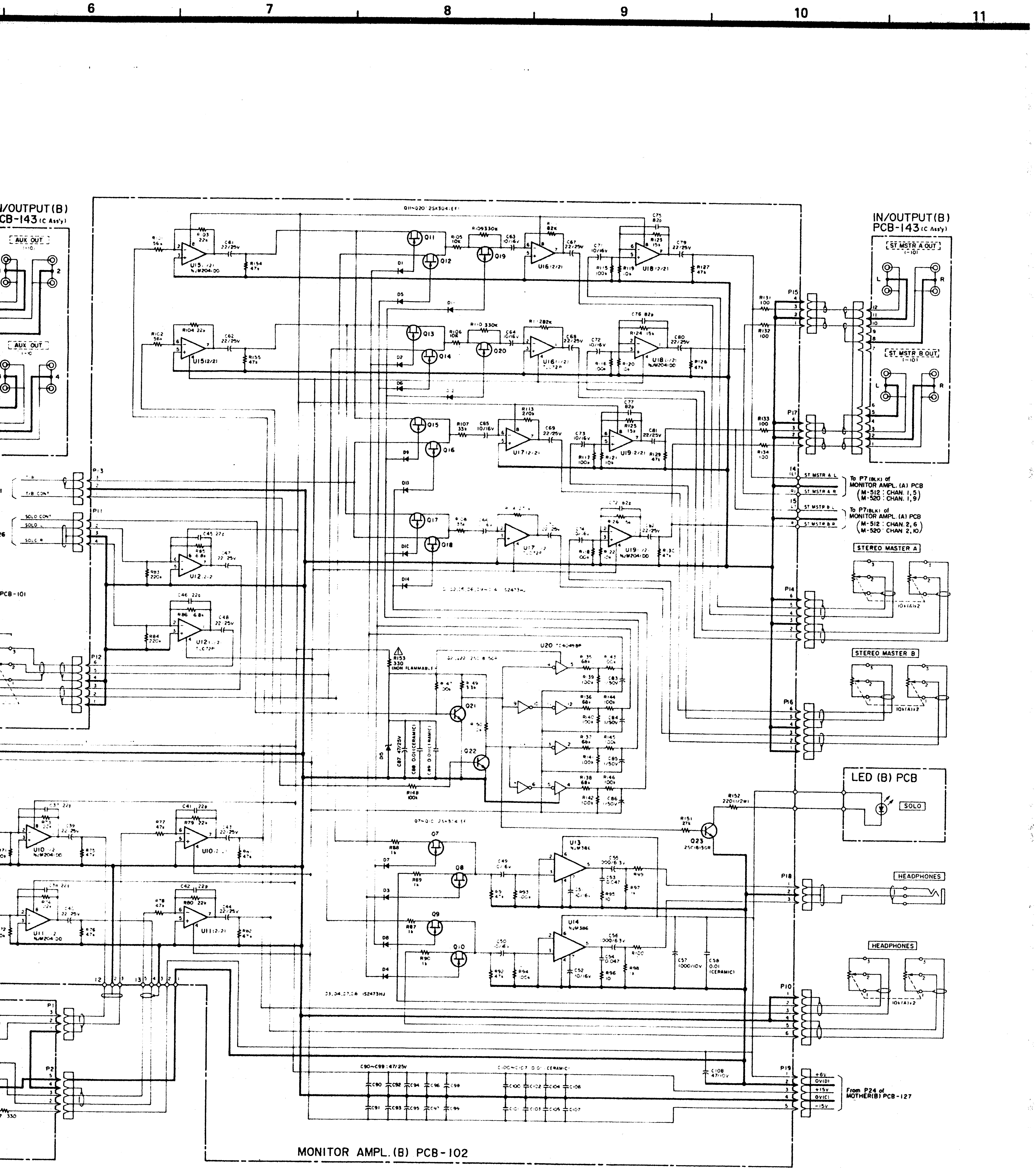
4-13. Buss Ampl. PCB


1
2
3
4
5
6
A
B
C
D
E
F
G
From P4 of TALKBACK PCB-111
SLATE IN
P13
(CHAN. 1)
C105 47p
R102 22k
R104 22k
R103 22k
C106 22p
R105 22k
C101 22/25V
R107 100
R106 47k
R101 22k
U101 (1/2) NJM4556D
U101 (2/2)
(CHAN. 2)
C201, C205, C206
R201 ~ R207
U201
(CHAN. 3)
C301, C305, C306
R301 ~ R307
U301
(CHAN. 4)
C401, C405, C406
R401 ~ R407
U401
(CHAN. 5)
C501, C505, C506
R501 ~ R507
U501
(CHAN. 6)
C601, C605, C606
R601 ~ R607
U601
(CHAN. 7)
C701, C705, C706
R701 ~ R707
U701
(CHAN. 8)
C801, C805, C806
R801 ~ R807
U801
P1
P2
P3
P4
From P7 of MOTHER (A) PCB-126
BUSS 1
BUSS 3
BUSS 5
BUSS 7
From P8 of MOTHER (A) PCB-126
BUSS 2
BUSS 4
BUSS 6
BUSS 8
IN/OUTPUT PCB-143 (B Ass'y)
PGM ACCESS (-10)
SEND
RCV
BUSS MASTER
BRN
GRY
WHT
BLK
10k (A)
(BLK)
To P15 of MOTHER (A) PCB (M-520 only)
From P23 of MOTHER (B) PCB-126
+15V
0V
-15V
P12
C1 ~ C6 : 47/25V
C7 ~ C22 : 0.01/50V (CERAMIC)
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22

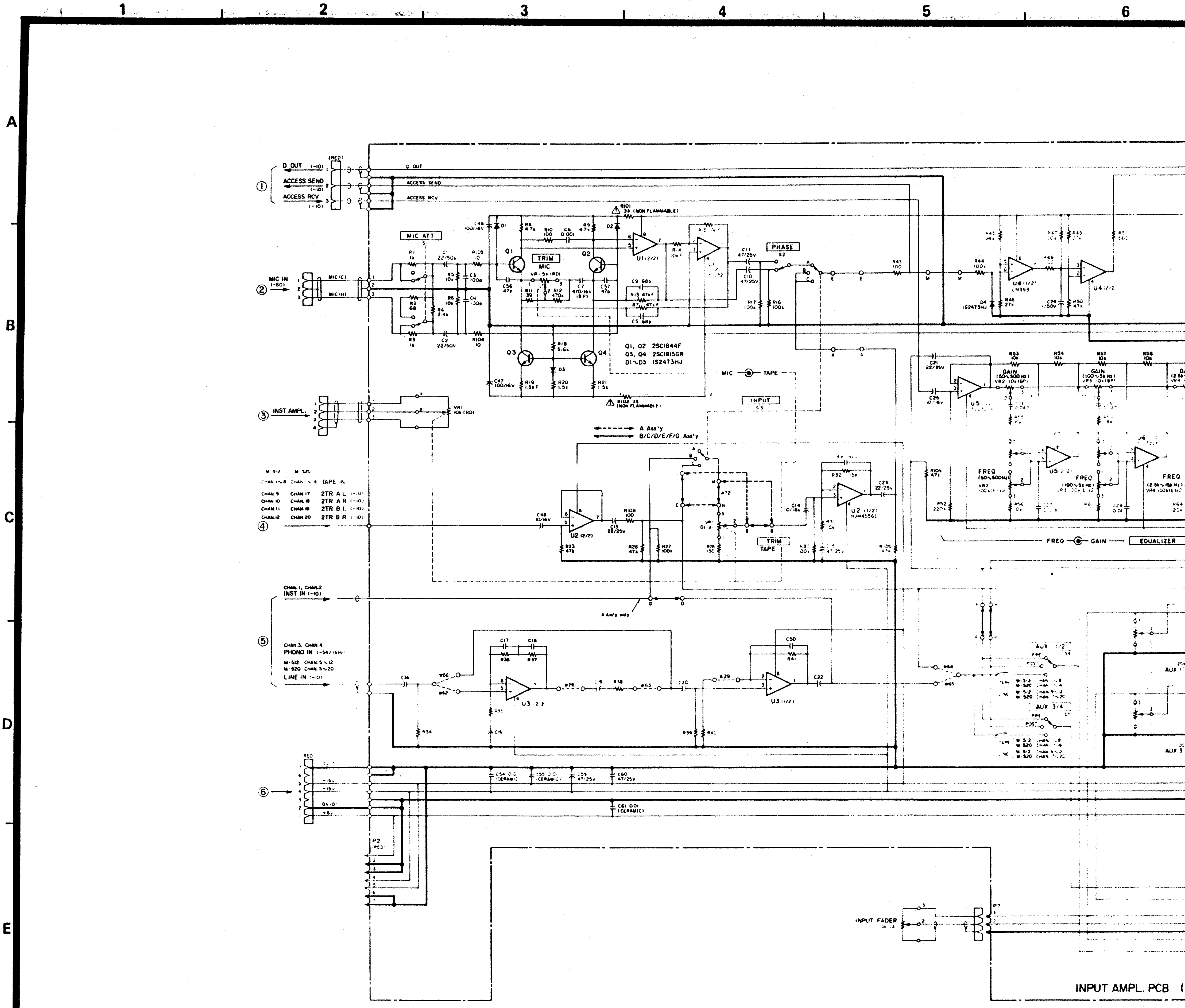

6
7
8
9
10
11
BUSS MASTER
P15
BRN (BLK)
GRY (BLK)
WHT (BLK)
BLK (BLK)
10k (A)
P5
C102 10/16V
C202 10/16V
C302 10/16V
C402 10/16V
BUSS MASTER
P16
BRN (RED)
GRY (RED)
WHT (RED)
BLK (RED)
P6
C502 10/16V
C602 10/16V
C702 10/16V
C802 10/16V
(CHAN. 1)
C107 82p
R111 15k
R108
C103 10/16V
R109 100k
R110 10k
U102(1/2) NJM4556D
C108 22/25V
R112 100k
R113 10
U102 (2/2)
C104 22/25V
R116 100
R117 47k
(CHAN. 2)
C203, C204, C207, C209
R208 ~ R212, R216 ~ R218
U202
(CHAN. 3)
C303, C304, C307, C309
R308 ~ R312, R316 ~ R318
U302
(CHAN. 4)
C403, C404, C407, C409
R408 ~ R412, R416 ~ R418
U402
(CHAN. 5)
C503, C504, C507, C509
R508 ~ R512, R516 ~ R518
U502
(CHAN. 6)
C603, C604, C607, C609
R608 ~ R612, R616 ~ R618
U602
(CHAN. 7)
C703, C704, C707, C709
R708 ~ R712, R716 ~ R718
U702
(CHAN. 8)
C803, C804, C807, C809
R808 ~ R812, R816 ~ R818
U802
P7
P8
P9
IN/OUTPUT PCB-143
(D Ass'y)
PGM OUT (-10)
1
3
5
7
IN/OUTPUT PCB-143
(D Ass'y)
PGM OUT (-10)
2
4
6
8
BUSS 1
BUSS 2
BUSS 3
BUSS 4
To P12 of MOTHER (A) PCB-126
BUSS 1
BUSS 2
BUSS 3
BUSS 4
BUSS 5
BUSS 5
BUSS 6
BUSS 6
BUSS 7
BUSS 7
BUSS 8
BUSS 8
P1 (CHAN. 1, 9)
P1 (CHAN. 2, 10)
P1 (CHAN. 3, 11)
P1 (CHAN. 4, 12)
P1 (CHAN. 5, 13)
P1 (CHAN. 6, 14)
P1 (CHAN. 7, 15)
P1 (CHAN. 8, 16)
MONITOR AMPL. (A) PCB
P1 (CHAN. 1, 5)
P1 (CHAN. 2, 6)
P1 (CHAN. 3, 7)
P1 (CHAN. 4, 8)
P1 (CHAN. 1, 5)
P1 (CHAN. 2, 6)
P1 (CHAN. 3, 7)
P1 (CHAN. 4, 8)
MONITOR AMPL. (A) PCB-101
P11
P11
P11
P11
MOTER (A) PCB
P5 (CHAN. 1, 5)
P5 (CHAN. 2, 6)
P5 (CHAN. 3, 7)
P5 (CHAN. 4, 8)
MONITOR AMPL. (A) PCB-101
M-520
M-512
P14
To P2 of TALKBACK PCB-111
BUSS AMPL. PCB - 103

4-14. Monitor Ampl. (B) PCB


1
2
3
4
5
6
A
B
C
D
E
F
G
From P4 of TALKBACK PCB-111
SLATE
P2
P3
P1
From P19(BLK) of MOTHER(B) PCB-127
AUX 1
AUX 2
AUX 3
AUX 4
AUX 1/2
AUX 3/4
P4
U1(1/2) TL072P
U1(2/2)
U3(1/2) TL072P
U3(2/2)
U5(1/2) NJM4556D
U5(2/2)
U2
U4
U6(1/2)
U2(2/2)
U4(2/2)
U6(2/2)
IN/OUTPUT(B) PCB-143 (C Ass'y)
AUX OUT
P5
From P5 of TALKBACK PCB-111
T/B CONT
From P8 of MOTHER(A) PCB-126
SOLO CONT
SOLO
P11
P12
To P6(L) of MONITOR AMPL (A) PCB-101
SOLO
From P3 of MONITOR AMPL (A) PCB (M-512 : CHAN. 1, 5) (M-520 : CHAN. 1, 9)
MON L
GND
MON R
To P20 of MOTHER(B) PCB-127
IN/OUTPUT(B) PCB-143 (B Ass'y)
SUB IN AUX (-10)
SUB IN MON (-10)
P8
P9
U7 NJM2043DD
U7(2/2)
U8 NJM2043DD
U8(2/2)
U9(1/2)
U9(2/2) NJM2043DD
MON L
MON R
SPARE L
SPARE R
From P22(RED) of MOTHER(B) PCB-127
MONITOR SELECT
P6 (BLK)
P3
P4 (RED)
P5 (BLK)
S1-2
S1-3
S1-4
S1-5
S1-6
S1-7
SW(E) PCB
U10 NJM2043DD
U11 NJM2043DD
P1
P2
S1-1 MONITOR MONO
R017 330


6
7
8
9
10
11
IN/OUTPUT(B)
PCB-143 (C Ass'y)
AUX OUT
ST. MSTR A OUT
ST. MSTR B OUT
Q11~Q20 : 2SK304(F)
U15
U16
U17
U18
U19
U12
U10
U11
NJM2041DD
P15
P17
P13
P11
P12
P14
P16
P18
P10
P19
P1
P2
T/B CONT
SOLO CONT
SOLO L
SOLO R
ST. MSTR A L
ST. MSTR A R
ST. MSTR B L
ST. MSTR B R
To P7 (BLK) of MONITOR AMPL. (A) PCB (M-512 : CHAN. 1,5) (M-520 : CHAN. 1,9)
To P7 (BLK) of MONITOR AMPL. (A) PCB (M-512 : CHAN. 2,6) (M-520 : CHAN. 2,10)
STEREO MASTER A
STEREO MASTER B
10k(A)×2
U20 TC4049BP
R153 330 (NON FLAMMABLE)
Q21
Q22
LED (B) PCB
SOLO
R152 220(1/2W)
R151 27k
Q23 2SC1815GR
Q7~Q10 : 2SK304(F)
Q7
Q8
Q9
Q10
U13 NJM386
U14 NJM386
HEADPHONES
C57 1000/10V
C58 0.01 (CERAMIC)
C108 47/10V
C90~C99 : 47/25V
C100~C107 : 0.01 CERAMIC
+6V
0V(D)
+15V
0V(C)
-15V
From P24 of MOTHER(B) PCB-127
MONITOR AMPL. (B) PCB-102

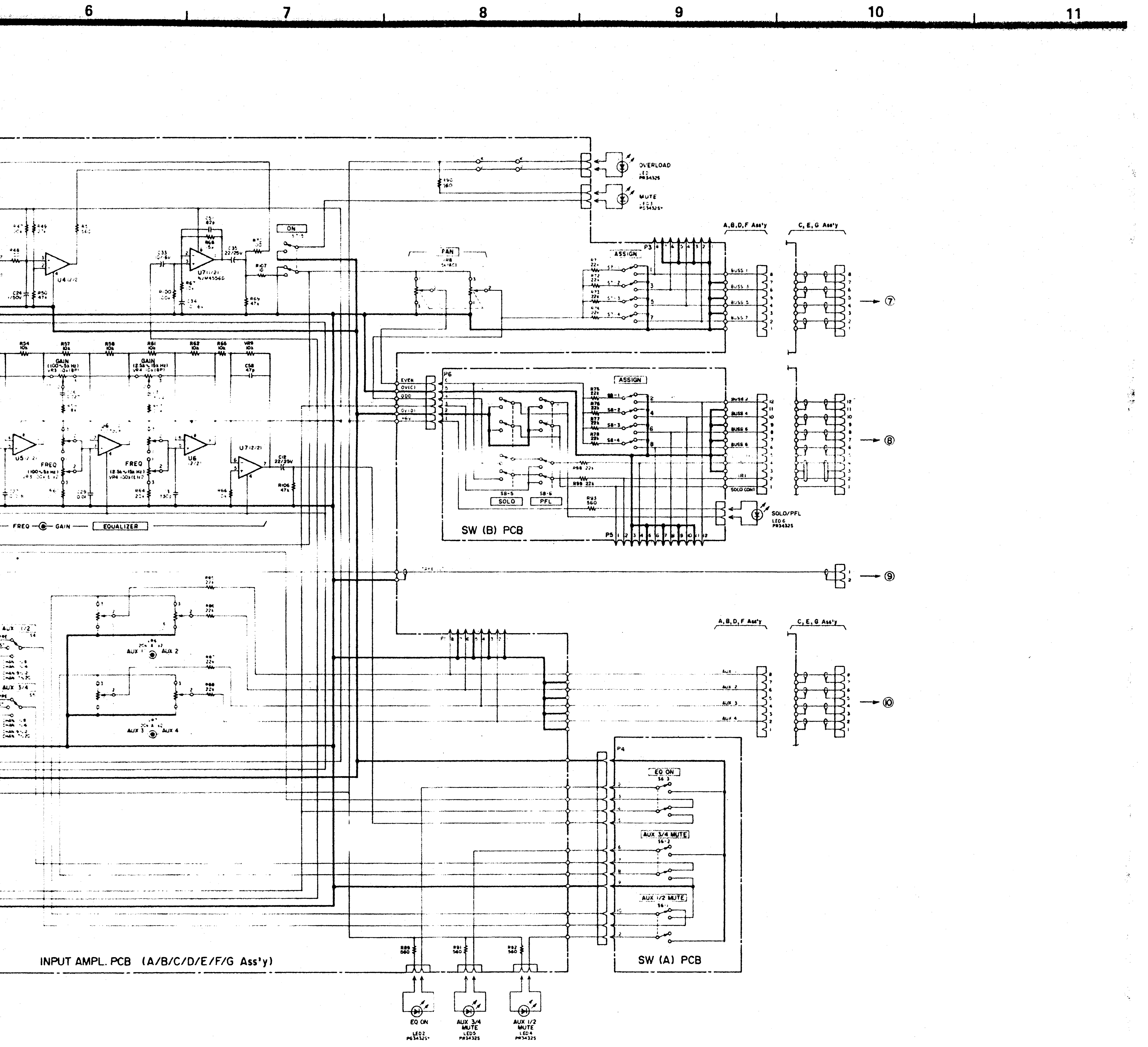
4-15. Input Ampl. (A/B/C/D/E/F/G) PCB


1
2
3
4
5
6
A
B
C
D
E
①
D. OUT (-10)
ACCESS SEND (-10)
ACCESS RCV (-10)
(RED)
ACCESS SEND
ACCESS RCV
②
MIC IN (-60)
MIC (C)
MIC (H)
MIC ATT
S1
R1 1k
C1 22/50v
R103 10
R5 10k
C3 100p
R2 68
R4 2.4k
R6 10k
C4 100p
R3 1k
C2 22/50v
R104 10
C46 100/16V
D1
R8 4.7k
R10 100
C6 0.001
R9 4.7k
D2
R101 33 (NON FLAMMABLE)
Q1
Q2
TRIM
MIC
VR1 5k (RD)
R11 39
R12 470k
C56 47p
C7 470/16V (BP)
C57 47p
C9 68p
R13 47kF
R7 47kF
C5 68p
U1 (2/2)
R14 10kF
C11 47/26V
C10 47/25V
PHASE
S2
Q3
Q4
R18 5.6k
D3
C47 100/16V
R19 1.5kF
R20 1.5k
R21 1.5k
R102 33 (NON FLAMMABLE)
Q1, Q2 2SC1844F
Q3, Q4 2SC1815GR
D1~D3 1S2473HJ
MIC — TAPE
INPUT
S3
③
INST AMPL.
VR1 10k (RD)
A Ass'y
B/C/D/E/F/G Ass'y
M-512
M-520
CHAN.1~8 CHAN.1~16 TAPE IN
CHAN.9 CHAN.17 2TR A L (-10)
CHAN.10 CHAN.18 2TR A R (-10)
CHAN.11 CHAN.19 2TR B L (-10)
CHAN.12 CHAN.20 2TR B R (-10)
④
C48 10/16V
U2 (2/2)
R23 47k
C13 22/25V
R108 100
R26 47k
R27 100k
W72
TRIM
TAPE
R28 150
C14 10/16V
R32
C23 22/25V
R31
U2 (1/2) NJM4556D
CHAN.1, CHAN.2
INST IN (-10)
A Ass'y only
⑤
CHAN.3, CHAN.4
PHONO IN (-54/1kHz)
M-512 CHAN.5~12
M-520 CHAN.5~20
LINE IN (-10)
C36
W66
W62
C17
C18
R36
R37
U3 (2/2)
R35
C16
R34
W28
R38
W63
C20
W29
C50
R41
U3 (1/2)
C22
R39
R40
⑥
RED
+15v
-15v
0V (D)
+6v
C54 0.01 (CERAMIC)
C55 0.01 (CERAMIC)
C59 47/25V
C60 47/25V
C61 0.01 (CERAMIC)
P2 RED
R43 100
R44 100k
U4 (1/2) LM393
U4 (2/2)
D4 1S2473HJ
R46 27k
C24
R50 47k
C21 22/25V
C25 10/16V
U5
R53 10k
GAIN (50~500Hz) VR2 10k (BP)
R54
R57 10k
GAIN (100~5kHz) VR3 10k (BP)
R58 10k
FREQ (50~500Hz) VR2
FREQ (100~5kHz) VR3
FREQ (2.5k~15kHz) VR4
R52 220k
FREQ — GAIN — EQUALIZER
AUX 1/2
AUX 3/4
PRE
POST
W64
W65
INPUT FADER
INPUT AMPL. PCB

PCB Ass'y	CHANNEL		INPUT S3 POSITION			Ref. No.																												
	M-512	M-520	A	B	C	U3	VR1	R34	R35	R36	R37	R38	R39	R40	R41	C16	C17	C18	C19	C20	C22	C36	C50	W28	W29	W62	W63	W64	W65	W66	W69	W70	W71	W72
A	1, 2	1, 2	MIC	INST	TAPE	Not mounted	5k(RD) + 10k(RD) + 10k(A)	Not mounted																Open				Short-ing	Open	Open	Open			
B	3	3		PHONO		NJM2041DD	5k(RD) + 10k(A)	47k	4.7k	47k	560k	1k	100k	1k	10k	100/16V	0.0015 (J)	0.0047 (J)	22/25V	10/16V	22/25V	10/16V	82p	Shorting							Shorting			
C	4	4																																
D	5, 6, 7	5, 6, 7 9, 10, 11 13, 14, 15	MIC	LINE	TAPE			Not mounted						Not mount-ed	0 Ω (Short-ing)	Not mounted						0 Ω (Short-ing)	Not mount-ed	Open						Short-ing				
E	8	8, 12, 16																																
F	9	17	MIC	LINE	2TR A L																							Open	Short-ing					
	10	18			2TR A R																													
	11	19			2TR B L																													
G	12	20			2TR B R																													

CONNECTIONS

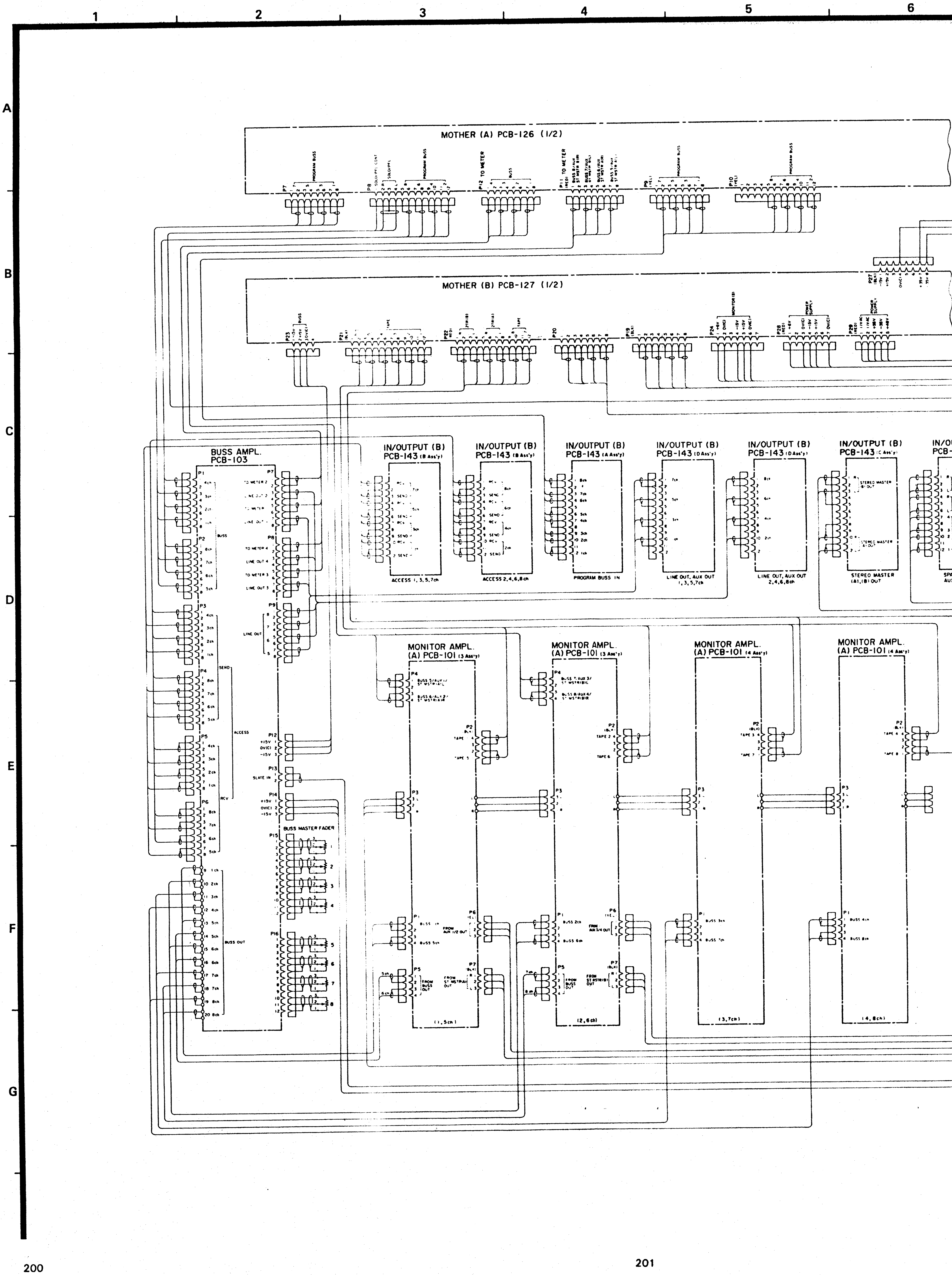
MODEL		CHANNEL	
M-512	M-520	1	IN/OUT
		2	IN/OUT
		3	IN/OUT
		4	IN/OUT
M-512	M-520	5	IN/OUT
		6	IN/OUT
		7	IN/OUT
	M-520	8	IN/OUT
M-512	M-520	9	IN/OUT
M-512	M-520	10	IN/OUT
M-512	M-520	11	IN/OUT
M-512	M-520	12	IN/OUT
		13	IN/OUT
		14	IN/OUT
		15	IN/OUT
		16	IN/OUT
		17	IN/OUT
		18	IN/OUT
		19	IN/OUT
		20	IN/OUT

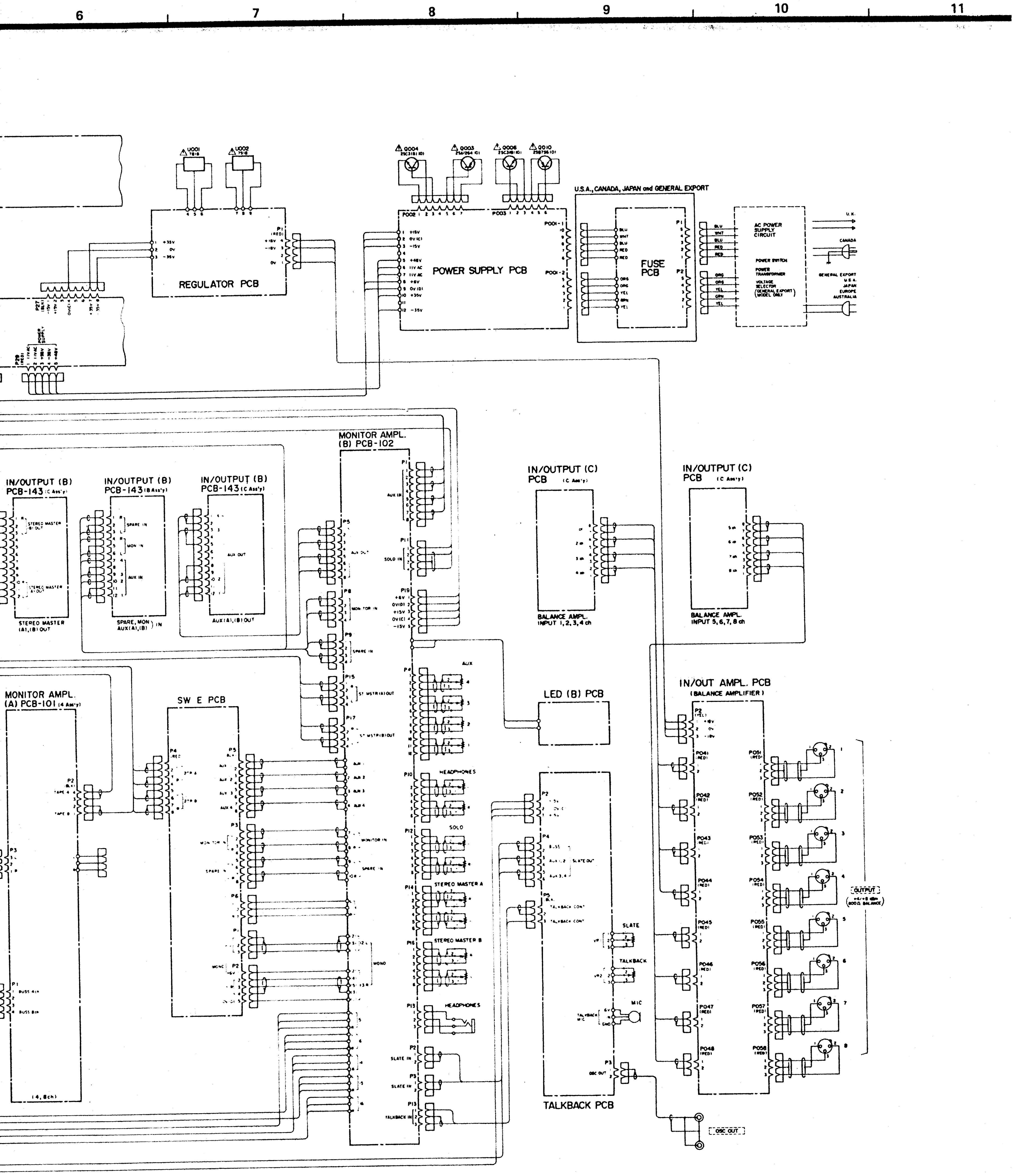

6
7
8
9
10
11
OVERLOAD
LED
PR34325
MUTE
LED 1
PG34325Y
ON
PAN
ASSIGN
A,B,D,F Ass'y
C, E, G Ass'y
BUSS 1
BUSS 3
BUSS 5
BUSS 7
⑦
P3
P6
EVEN
ODD
ASSIGN
BUSS 2
BUSS 4
BUSS 6
BUSS 8
SOLO CONT
⑧
SOLO
PFL
SOLO/PFL
LED 6
PR34325
SW (B) PCB
P5
U4 (1/2)
U5 (2/2)
U6 (2/2)
U7 (1/2)
NJM4556D
U7 (2/2)
GAIN
FREQ
FREQ
GAIN
EQUALIZER
⑨
A, B, D, F Ass'y
C, E, G Ass'y
AUX 1/2
AUX 3/4
AUX 1
AUX 2
AUX 3
AUX 4
⑩
P4
EQ ON
AUX 3/4 MUTE
AUX 1/2 MUTE
SW (A) PCB
INPUT AMPL. PCB (A/B/C/D/E/F/G Ass'y)
EQ ON
LED2
PG34325Y
AUX 3/4
MUTE
LED5
PR34325
AUX 1/2
MUTE
LED4
PR34325

CONNECTIONS

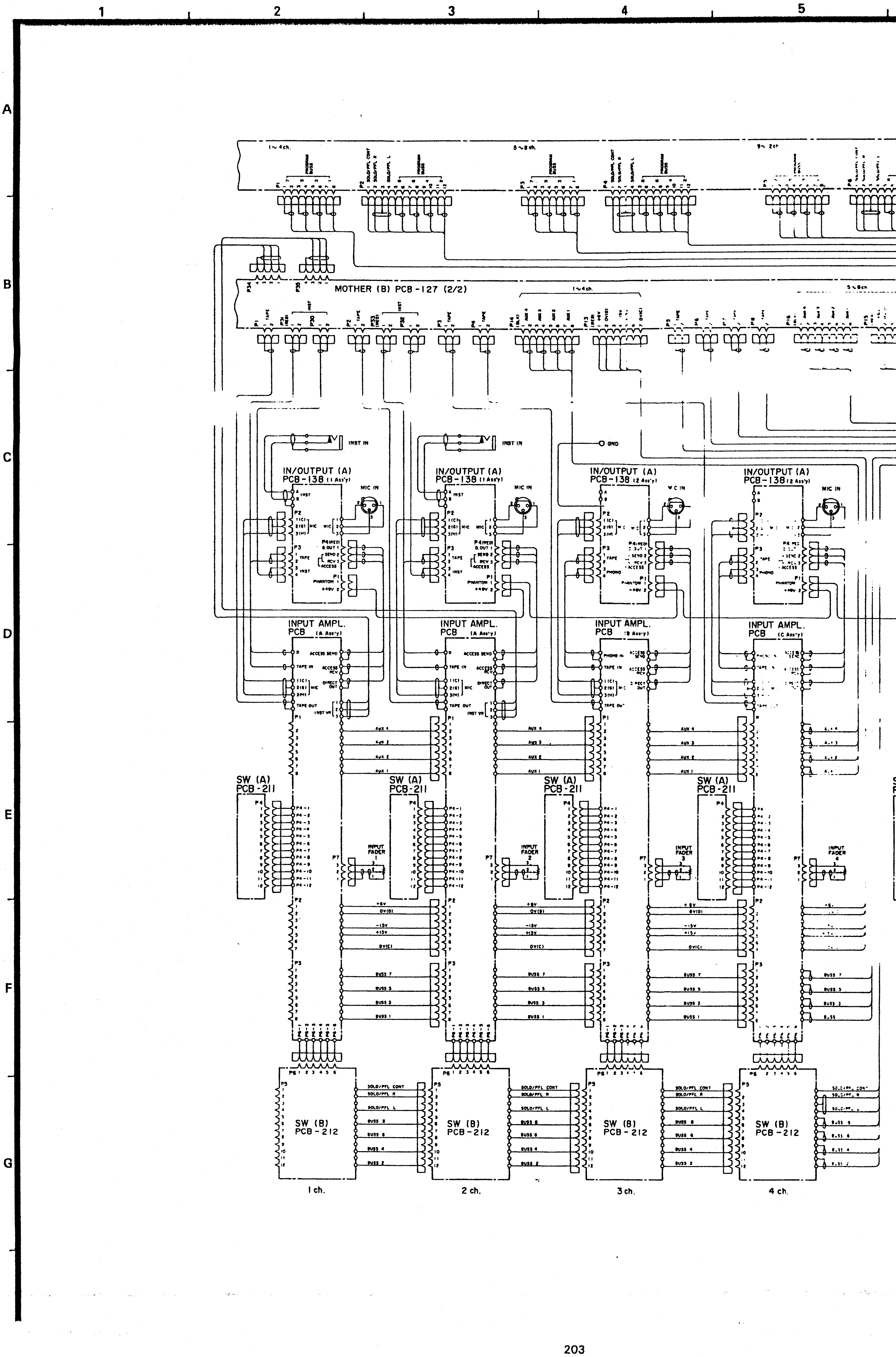
MODEL		CHANNEL	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	CHANNEL	MODEL	
M 512	M 520	1	IN/OUTPUT (A) PCB P4 of CH 1	IN/OUTPUT (A) PCB P2 of CH.1	MOTHER (B) PCB P34	IN/OUTPUT (A) PCB P3 of CH.1	MOTHER (B) PCB P31	INPUT AMPL. PCB P2 of CH 2	INPUT AMPL. PCB P3 of CH.2	SW (B) PCB P5 of CH 2	MOTHER (B) PCB P1	INPUT AMPL. PCB P1 of CH 2	1	M-520	M-512
		2	IN/OUTPUT (A) PCB P4 of CH 2	IN/OUTPUT (A) PCB P2 of CH.2	MOTHER (B) PCB P35	IN/OUTPUT (A) PCB P3 of CH.2	MOTHER (B) PCB P33	INPUT AMPL. PCB P2 of CH 3	INPUT AMPL. PCB P3 of CH 3	SW (B) PCB P5 of CH.3	MOTHER (B) PCB P2	INPUT AMPL. PCB P1 of CH 3	2		
		3	IN/OUTPUT (A) PCB P4 of CH 3	IN/OUTPUT (A) PCB P2 of CH.3		IN/OUTPUT (A) PCB P1 of CH.3		INPUT AMPL. PCB P2 of CH 4	INPUT AMPL. PCB P3 of CH 4	SW (B) PCB P5 of CH 4	MOTHER (B) PCB P3	INPUT AMPL. PCB P1 of CH 4	3		
		4	IN/OUTPUT (A) PCB P4 of CH 4	IN/OUTPUT (A) PCB P2 of CH.4		IN/OUTPUT (A) PCB P1 of CH.4		MOTHER (B) PCB P13 MOTHER (B) PCB P36	MOTHER (A) PCB P1 MOTHER (A) PCB P18	MOTHER (A) PCB P2 MOTHER (A) PCB P19	MOTHER (B) PCB P4 MOTHER (B) PCB P4	MOTHER (B) PCB P14 MOTHER (B) PCB P37	4		
M-512	M-520	5	IN/OUTPUT (A) PCB P4 of CH 5	IN/OUTPUT (A) PCB P2 of CH.5		IN/OUTPUT (A) PCB P1 of CH 5		INPUT AMPL. PCB P2 of CH 6	INPUT AMPL. PCB P3 of CH 6	SW (B) PCB P5 of CH 6	MOTHER (B) PCB P5	INPUT AMPL. PCB P1 of CH 6	5	M-520	M-512
		6	IN/OUTPUT (A) PCB P4 of CH 6	IN/OUTPUT (A) PCB P2 of CH.6		IN/OUTPUT (A) PCB P1 of CH.6		INPUT AMPL. PCB P2 of CH.7	INPUT AMPL. PCB P3 of CH.7	SW (B) PCB P5 of CH.7	MOTHER (B) PCB P6	INPUT AMPL. PCB P1 of CH 7	6		
		7	IN/OUTPUT (A) PCB P4 of CH 7	IN/OUTPUT (A) PCB P2 of CH.7		IN/OUTPUT (A) PCB P1 of CH.7		INPUT AMPL. PCB P2 of CH 8	INPUT AMPL. PCB P3 of CH 8	SW (B) PCB P5 of CH 8	MOTHER (B) PCB P7	INPUT AMPL. PCB P1 of CH 8	7		
	M 520	8	IN/OUTPUT (A) PCB P4 of CH 8	IN/OUTPUT (A) PCB P2 of CH 8		IN/OUTPUT (A) PCB P1 of CH 8		MOTHER (B) PCB P15 MOTHER (B) PCB P38	MOTHER (A) PCB P3 MOTHER (A) P20	MOTHER (A) PCB P4 MOTHER (A) PCB P21	MOTHER (B) PCB P8 MOTHER (B) PCB P8	MOTHER (B) PCB P16 MOTHER (B) PCB P39	8	M-520	
M-512	M-520	9	IN/OUTPUT (A) PCB P4 of CH 9	IN/OUTPUT (A) PCB P2 of CH 9		IN/OUTPUT (A) PCB P1 of CH 9		INPUT AMPL. PCB P2 of CH 10	INPUT AMPL. PCB P3 of CH 10	SW (B) PCB P5 of CH 10	MOTHER (B) PCB P9 MOTHER (B) PCB P40	INPUT AMPL. PCB P1 of CH 10	9	M-520	M-512
M-512	M-520	10	IN/OUTPUT (A) PCB P4 of CH 10	IN/OUTPUT (A) PCB P2 of CH 10		IN/OUTPUT (A) PCB P1 of CH 10		INPUT AMPL. PCB P2 of CH 11	INPUT AMPL. PCB P3 of CH 11	SW (B) PCB P5 of CH 11	MOTHER (B) PCB P10 MOTHER (B) PCB P41	INPUT AMPL. PCB P1 of CH 11	10	M-520	M-512
M-512	M-520	11	IN/OUTPUT (A) PCB P4 of CH 11	IN/OUTPUT (A) PCB P2 of CH.11		IN/OUTPUT (A) PCB P1 of CH.11		INPUT AMPL. PCB P2 of CH 12	INPUT AMPL. PCB P3 of CH 12	SW (B) PCB P5 of CH.12	MOTHER (B) PCB P11 MOTHER (B) PCB P42	INPUT AMPL. PCB P1 of CH 12	11	M-520	M-512
M-512	M-520	12	IN/OUTPUT (A) PCB P4 of CH 12	IN/OUTPUT (A) PCB P2 of CH 12		IN/OUTPUT (A) PCB P1 of CH.12		MOTHER (B) PCB P17 MOTHER (B) PCB P13	MOTHER (A) PCB P5 MOTHER (A) PCB P1	MOTHER (A) PCB P6 MOTHER (A) PCB P2	MOTHER (B) PCB P12 MOTHER (B) PCB P43	MOTHER (B) PCB P18 MOTHER (B) PCB P14	12	M-520	M-512
		13	IN/OUTPUT (A) PCB P4 of CH 13	IN/OUTPUT (A) PCB P2 of CH 13		IN/OUTPUT (A) PCB P1 of CH.13		INPUT AMPL. PCB P2 of CH 14	INPUT AMPL. PCB P3 of CH 14	SW (B) PCB P5 of CH 14	MOTHER (B) PCB P44	INPUT AMPL. PCB P1 of CH 14	13		
		14	IN/OUTPUT (A) PCB P4 of CH 14	IN/OUTPUT (A) PCB P2 of CH 14		IN/OUTPUT (A) PCB P1 of CH 14		INPUT AMPL. PCB P2 of CH 15	INPUT AMPL. PCB P3 of CH 15	SW (B) PCB P5 of CH.15	MOTHER (B) PCB P45	INPUT AMPL. PCB P1 of CH 15	14		
		15	IN/OUTPUT (A) PCB P4 of CH 15	IN/OUTPUT (A) PCB P2 of CH 15		IN/OUTPUT (A) PCB P1 of CH 15		INPUT AMPL. PCB P2 of CH 16	INPUT AMPL. PCB P3 of CH 16	SW (B) PCB P5 of CH 16	MOTHER (B) PCB P46	INPUT AMPL. PCB P1 of CH 16	15		
		16	IN/OUTPUT (A) PCB P4 of CH 16	IN/OUTPUT (A) PCB P2 of CH 16		IN/OUTPUT (A) PCB P1 of CH 16		MOTHER (B) PCB P15	MOTHER (A) PCB P3	MOTHER (A) PCB P4	MOTHER (B) PCB P47	MOTHER (B) PCB P16	16		
		17	IN/OUTPUT (A) PCB P4 of CH 17	IN/OUTPUT (A) PCB P2 of CH 17		IN/OUTPUT (A) PCB P1 of CH 17		INPUT AMPL. PCB P2 of CH 18	INPUT AMPL. PCB P3 of CH 18	SW (B) PCB P5 of CH 18	MOTHER (B) PCB P9	INPUT AMPL. PCB P1 of CH 18	17		
		18	IN/OUTPUT (A) PCB P4 of CH 18	IN/OUTPUT (A) PCB P2 of CH 18		IN/OUTPUT (A) PCB P1 of CH 18		INPUT AMPL. PCB P2 of CH 19	INPUT AMPL. PCB P3 of CH 19	SW (B) PCB P5 of CH 19	MOTHER (B) PCB P10	INPUT AMPL. PCB P1 of CH 19	18		
		19	IN/OUTPUT (A) PCB P4 of CH 19	IN/OUTPUT (A) PCB P2 of CH 19		IN/OUTPUT (A) PCB P1 of CH 19		INPUT AMPL. PCB P2 of CH.20	INPUT AMPL. PCB P3 of CH 20	SW (B) PCB P5 of CH 20	MOTHER (B) PCB P11	INPUT AMPL. PCB P1 of CH 20	19		
		20	IN/OUTPUT (A) PCB P4 of CH 20	IN/OUTPUT (A) PCB P2 of CH 20		IN/OUTPUT (A) PCB P1 of CH 20		MOTHER (B) PCB P17	MOTHER (A) PCB P5	MOTHER (A) PCB P6	MOTHER (B) PCB P12	MOTHER (B) PCB P18	20		

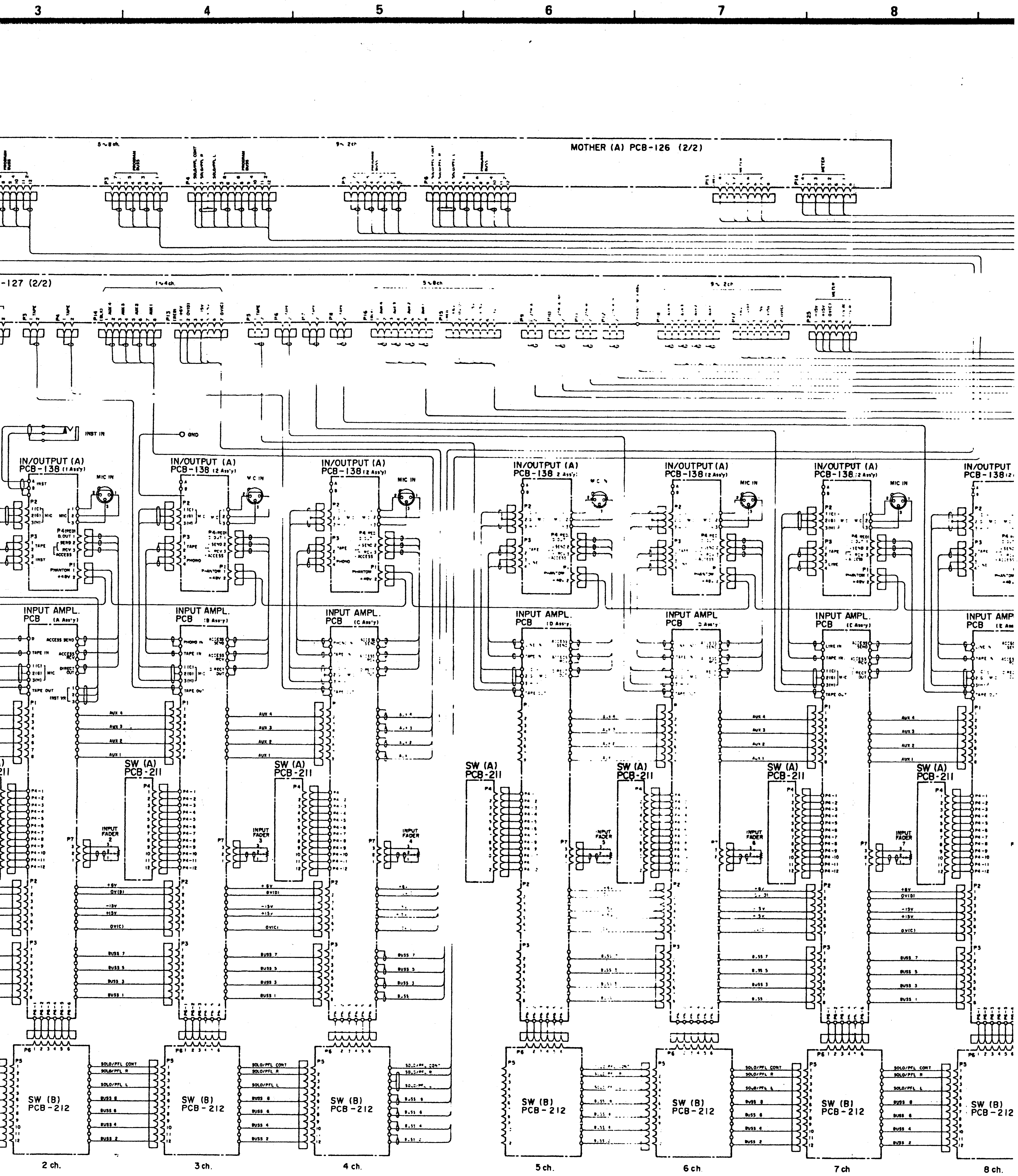
4-16. Wiring Diagram-1 [M-512]

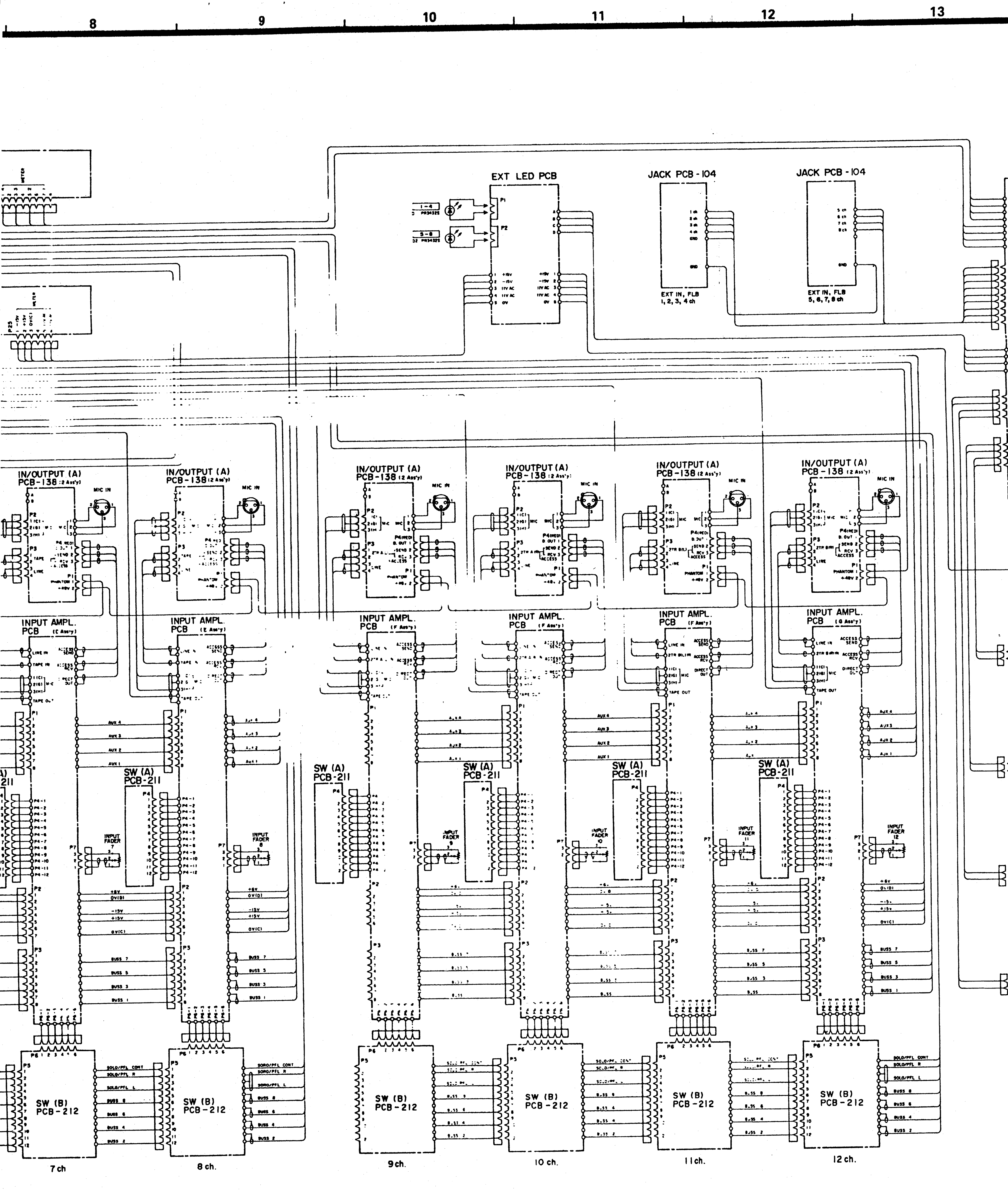

1
2
3
4
5
6
A
B
C
D
E
F
G
MOTHER (A) PCB-126 (1/2)
P7
P8
P12 TO METER
P11
P9
P10
MOTHER (B) PCB-127 (1/2)
P23
P21
P22
P20
P19
P24
P28
P29
P27
BUSS AMPL. PCB-103
P1
P2
P3
P4
P5
P6
P7
P8
P9
P12
P13
P14
P15
P16
BUSS
SEND
ACCESS
RCV
BUSS OUT
LINE OUT
SLATE IN
BUSS MASTER FADER
IN/OUTPUT (B) PCB-143 (B Ass'y)
ACCESS 1, 3, 5, 7ch
IN/OUTPUT (B) PCB-143 (B Ass'y)
ACCESS 2, 4, 6, 8ch
IN/OUTPUT (B) PCB-143 (A Ass'y)
PROGRAM BUSS IN
IN/OUTPUT (B) PCB-143 (D Ass'y)
LINE OUT, AUX OUT 1, 3, 5, 7ch
IN/OUTPUT (B) PCB-143 (D Ass'y)
LINE OUT, AUX OUT 2, 4, 6, 8ch
IN/OUTPUT (B) PCB-143 (C Ass'y)
STEREO MASTER (A1, (B) OUT
MONITOR AMPL. (A) PCB-101 (3 Ass'y)
(1, 5ch)
MONITOR AMPL. (A) PCB-101 (3 Ass'y)
(2, 6ch)
MONITOR AMPL. (A) PCB-101 (4 Ass'y)
(3, 7ch)
MONITOR AMPL. (A) PCB-101 (4 Ass'y)
(4, 8ch)

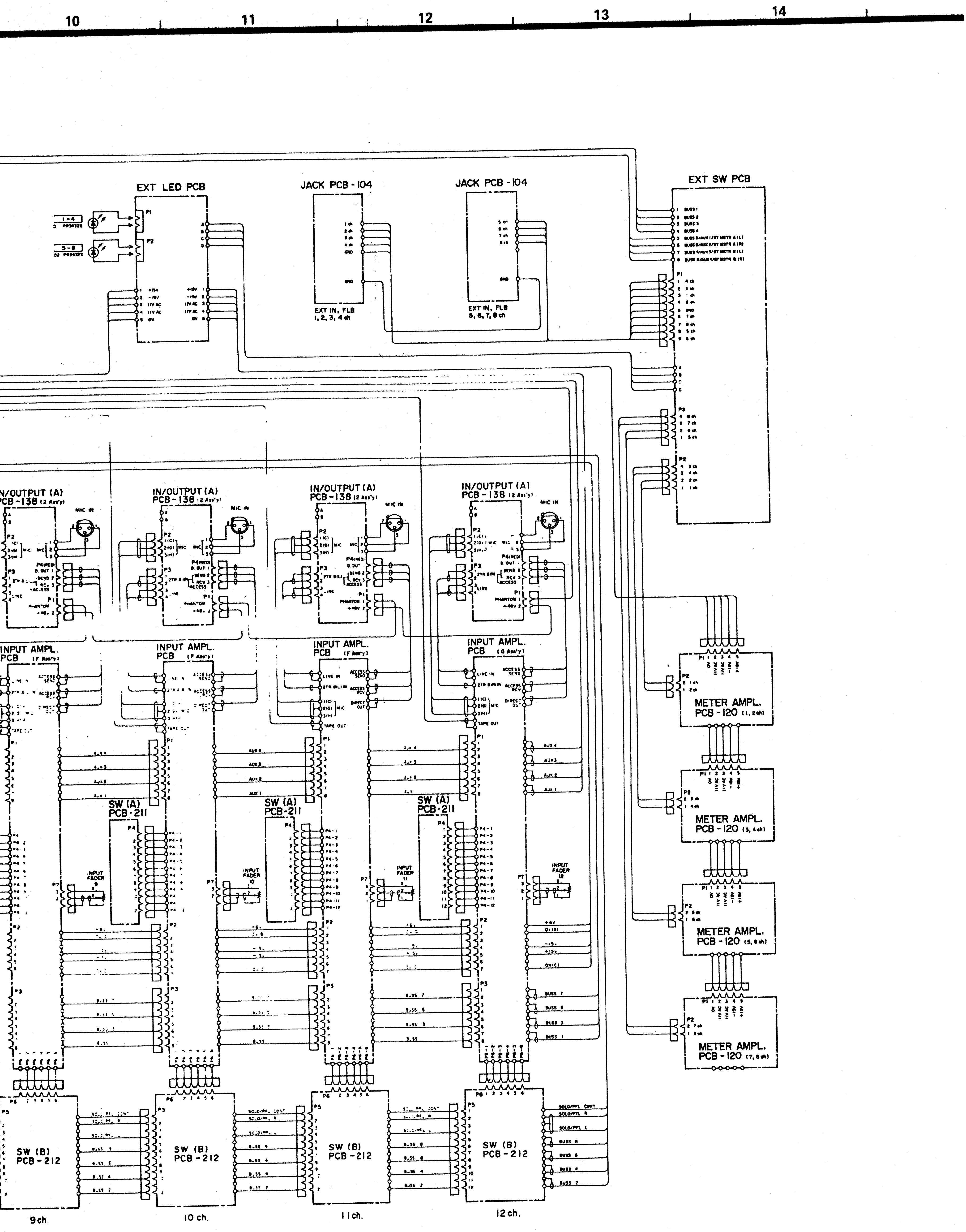

6
7
8
9
10
11
U001 7815
U002 7915
REGULATOR PCB
P1 (RED)
+35V
0V
-35V
+18V
-18V
P27
P28 (RED)
POWER SUPPLY
Q004 2SC3181(O)
Q003 2SA1264(O)
Q006 2SC3181(O)
Q010 2SB756(O)
P002
P003
P001-1
P001-2
+15V
0V(C)
-15V
+48V
11V AC
11V AC
+6V
0V(D)
+35V
-35V
POWER SUPPLY PCB
U.S.A., CANADA, JAPAN and GENERAL EXPORT
FUSE PCB
BLU
WHT
BLU
RED
RED
ORG
ORG
YEL
BRN
YEL
GRN
AC POWER SUPPLY CIRCUIT
POWER SWITCH
POWER TRANSFORMER
VOLTAGE SELECTOR (GENERAL EXPORT MODEL ONLY)
U.K.
CANADA
GENERAL EXPORT
U.S.A.
JAPAN
EUROPE
AUSTRALIA
IN/OUTPUT (B) PCB-143 (C Ass'y)
STEREO MASTER (B) OUT
STEREO MASTER (A) OUT
STEREO MASTER (A),(B) OUT
IN/OUTPUT (B) PCB-143 (B Ass'y)
SPARE IN
MON IN
AUX IN
SPARE, MON AUX (A),(B) IN
IN/OUTPUT (B) PCB-143 (C Ass'y)
AUX OUT
AUX (A),(B) OUT
MONITOR AMPL. (B) PCB-102
P1
AUX IN
P5
AUX OUT
P11
SOLO IN
P8
MONITOR IN
P19
+6V
0V(D)
+15V
0V(C)
-15V
P9
SPARE IN
P15
ST MSTR (A) OUT
P17
ST MSTR (B) OUT
P4
AUX
AUX 1
AUX 2
AUX 3
AUX 4
P10
HEADPHONES
P12
SOLO
P14
STEREO MASTER A
P16
STEREO MASTER B
P13
HEADPHONES
P2
SLATE IN
P3
SLATE IN
P13
TALKBACK IN
MONITOR IN
SPARE IN
MONO
IN/OUTPUT (C) PCB (C Ass'y)
BALANCE AMPL. INPUT 1, 2, 3, 4 ch
IN/OUTPUT (C) PCB (C Ass'y)
BALANCE AMPL. INPUT 5, 6, 7, 8 ch
LED (B) PCB
MONITOR AMPL. (A) PCB-101 (4 Ass'y)
P2
TAPE 4
TAPE 8
P3
P1
BUSS 4ch
BUSS 8ch
(4, 8ch)
SW E PCB
P4 (RED)
P5
AUX 1
AUX 2
AUX 3
AUX 4
P3
MONITOR IN
SPARE IN
P6
P2
MONO
+6V
P2
P4
BUSS
AUX 1, 2
AUX 3, 4
SLATE OUT
P5
TALKBACK CONT
TALKBACK CONT
SLATE
TALKBACK
MIC
TALKBACK MIC
GND
P3
OSC OUT
TALKBACK PCB
OSC OUT
IN/OUT AMPL. PCB (BALANCE AMPLIFIER)
P2 (YEL)
+18V
0V
-18V
P041 (RED)
P042 (RED)
P043 (RED)
P044 (RED)
P045 (RED)
P046 (RED)
P047 (RED)
P048 (RED)
P051 (RED)
P052 (RED)
P053 (RED)
P054 (RED)
P055 (RED)
P056 (RED)
P057 (RED)
P058 (RED)
1
2
3
4
5
6
7
8
OUTPUT
(+4/+8 dBm 600Ω BALANCE)

4-17. Wiring Diagram-2 [M-512]


1
2
3
4
5
A
B
C
D
E
F
G
1~4ch.
5~8ch.
PROGRAM BUSS
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
P34
P35
MOTHER (B) PCB-127 (2/2)
TAPE
INST
P1
P2
P3
P4
P30
P31
P32
P33
P13
P14
AUX 1
AUX 2
AUX 3
AUX 4
+5V
0V(D)
-15V
+15V
0V(C)
INST IN
GND
MIC IN
IN/OUTPUT (A) PCB-138 (1 Ass'y)
IN/OUTPUT (A) PCB-138 (2 Ass'y)
MIC
PHONO
B.OUT
SEND 2
RCV 3
ACCESS
PHANTOM
+48V
INPUT AMPL. PCB (A Ass'y)
INPUT AMPL. PCB (B Ass'y)
INPUT AMPL. PCB (C Ass'y)
ACCESS SEND
ACCESS RCV
TAPE IN
TAPE OUT
DIRECT OUT
INST VR
SW (A) PCB-211
P4-1
P4-2
P4-3
P4-4
P4-5
P4-6
P4-7
P4-8
P4-9
P4-10
P4-11
P4-12
P7
INPUT FADER 1
INPUT FADER 2
INPUT FADER 3
INPUT FADER 4
BUSS 1
BUSS 2
BUSS 3
BUSS 4
BUSS 5
BUSS 6
BUSS 7
BUSS 8
P5
P6
SW (B) PCB-212
1 ch.
2 ch.
3 ch.
4 ch.

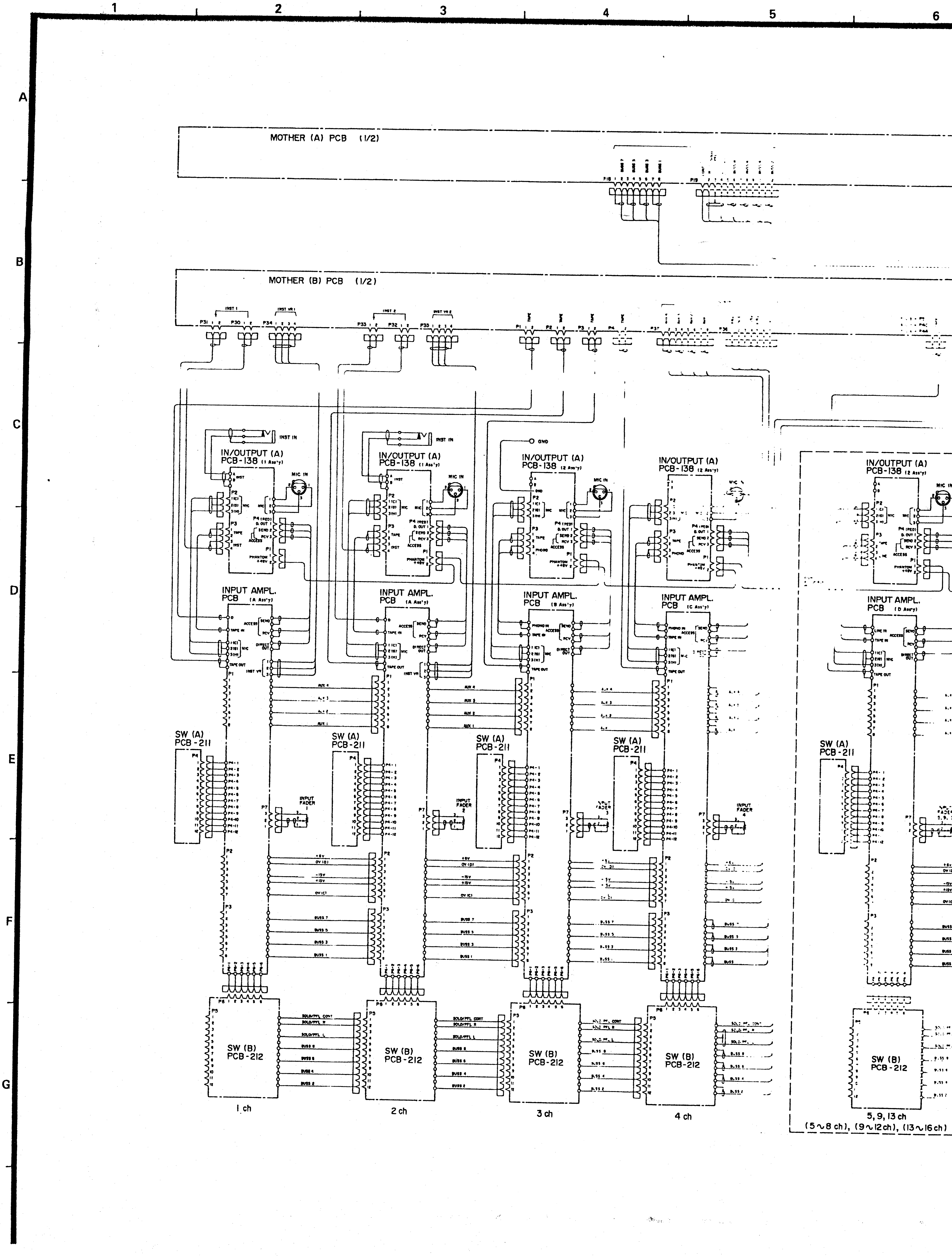

3
4
5
6
7
8
MOTHER (A) PCB-126 (2/2)
5~8ch.
9~2ch
PROGRAM BUSS
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
METER
-127 (2/2)
1~4ch.
5~8ch
9~2ch
TAPE
AUX 4
AUX 3
AUX 2
AUX 1
+15V
OV(D)
-15V
OV(C)
INST IN
GND
IN/OUTPUT (A)
PCB-138 (1 Ass'y)
PCB-138 (2 Ass'y)
MIC IN
INST
MIC
TAPE
PHONO
LINE
P4(RED)
D. OUT
SEND
RCV
ACCESS
PHANTOM
+48V
INPUT AMPL.
PCB (A Ass'y)
PCB (B Ass'y)
PCB (C Ass'y)
PCB (D Ass'y)
PCB (E Ass'y)
ACCESS SEND
ACCESS RCV
TAPE IN
PHONO IN
LINE IN
DIRECT OUT
TAPE OUT
INST VR
SW (A)
PCB-211
INPUT FADER
+8V
OV(D)
-15V
+15V
OV(C)
BUSS 7
BUSS 5
BUSS 3
BUSS 1
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
SW (B)
PCB-212
2 ch.
3 ch.
4 ch.
5 ch.
6 ch.
7 ch
8 ch.

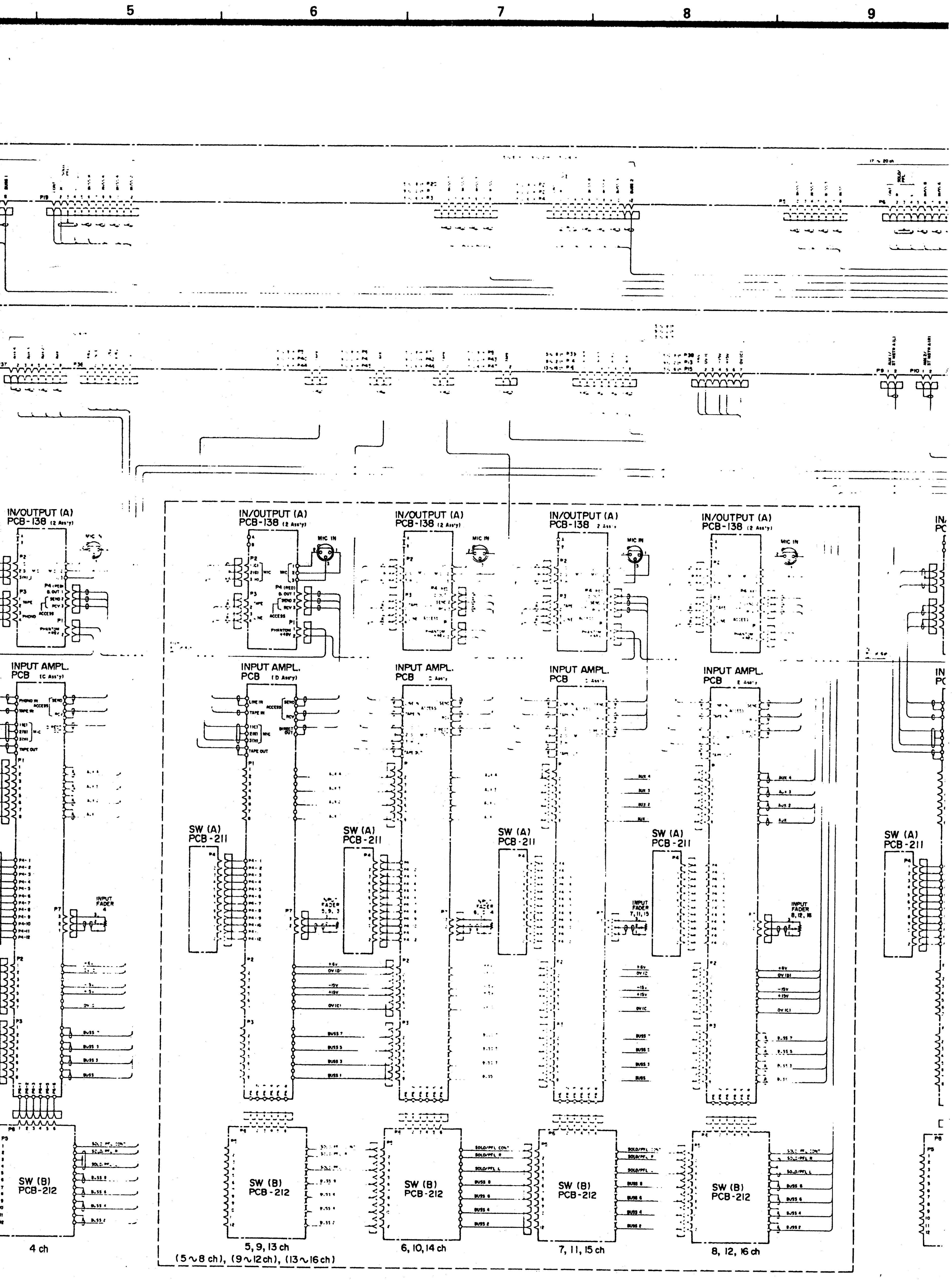

8
9
10
11
12
13
METER
P25
EXT LED PCB
P1
P2
1-4
5-8
+15V
-15V
11V AC
0V
JACK PCB-104
1 ch
2 ch
3 ch
4 ch
GND
EXT IN, FLB
1, 2, 3, 4 ch
JACK PCB-104
5 ch
6 ch
7 ch
8 ch
GND
EXT IN, FLB
5, 6, 7, 8 ch
IN/OUTPUT (A)
PCB-138 (2 Ass'y)
MIC IN
MIC
TAPE
LINE
2TR B(R)
B. OUT
SEND
RCV
ACCESS
PHANTOM
+48V
INPUT AMPL.
PCB (E Ass'y)
PCB (F Ass'y)
PCB (G Ass'y)
LINE IN
TAPE IN
ACCESS SEND
ACCESS RCV
DIRECT OUT
TAPE OUT
AUX 4
AUX 3
AUX 2
AUX 1
SW (A)
PCB-211
P4
INPUT FADER
7
8
9
10
11
12
+8V
0V(D)
-15V
+15V
0V(C)
BUSS 7
BUSS 5
BUSS 3
BUSS 1
P6
P5
SW (B)
PCB-212
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
7 ch
8 ch
9 ch
10 ch
11 ch
12 ch

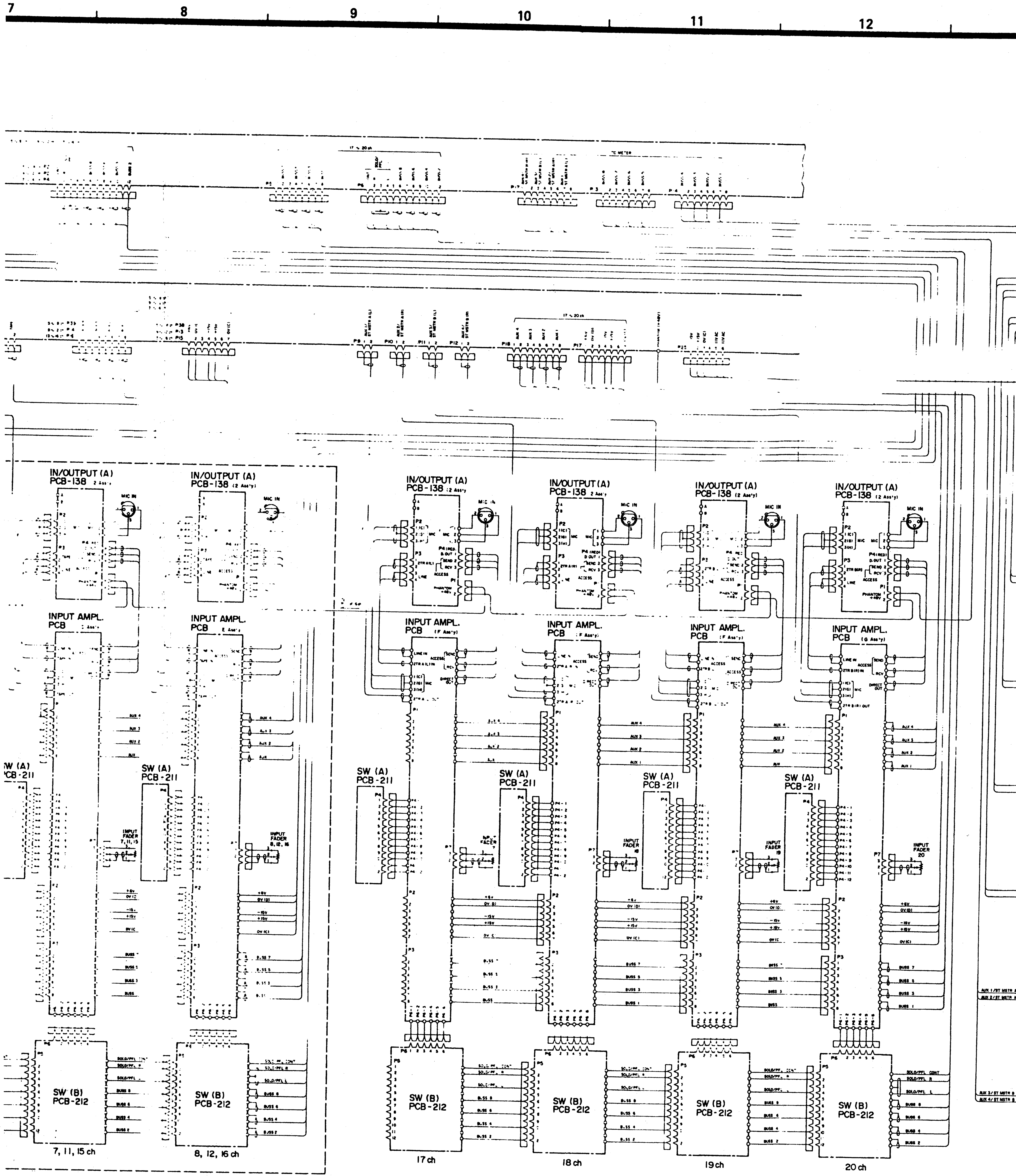


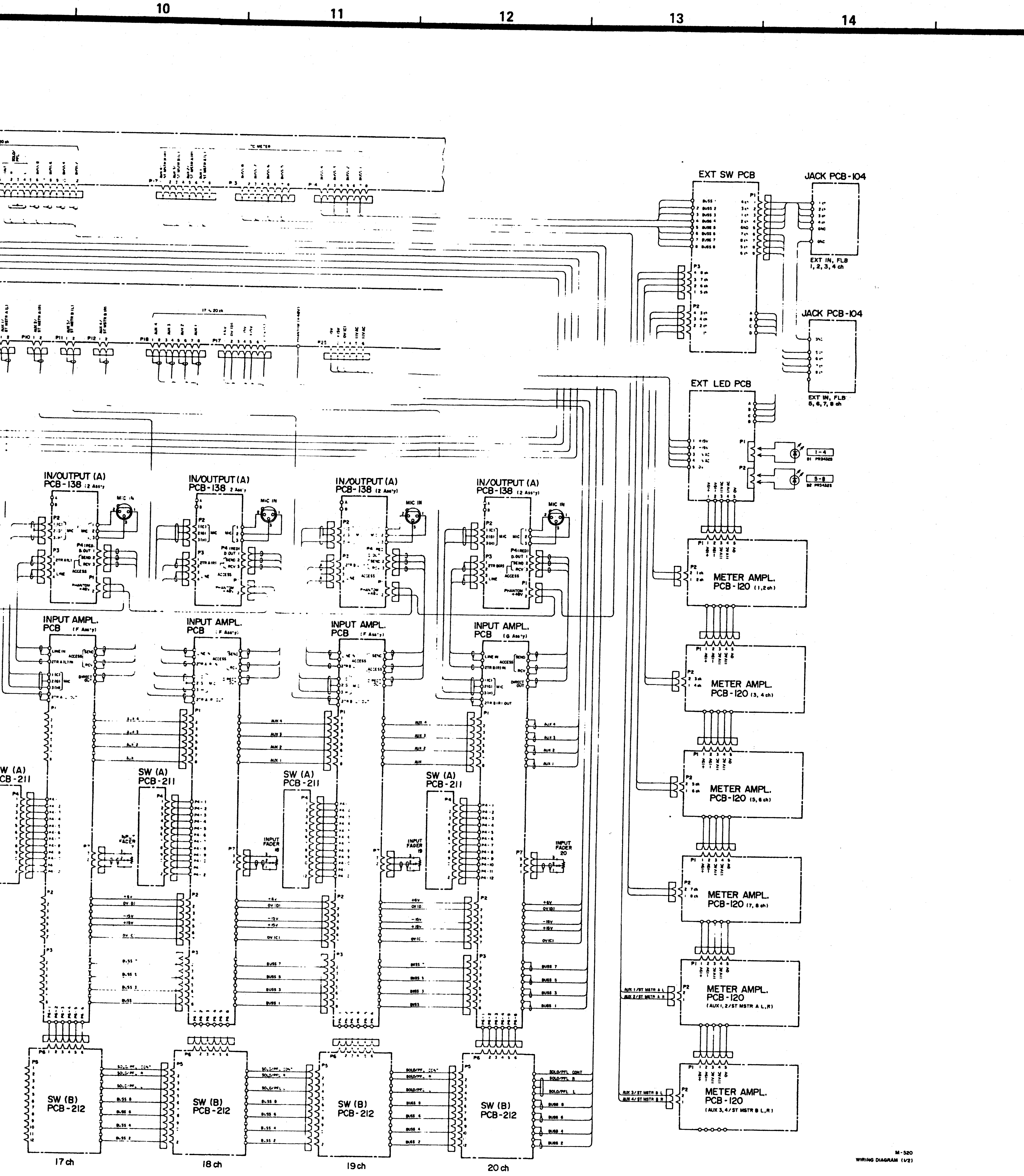
10
11
12
13
14
EXT LED PCB
JACK PCB - 104
JACK PCB - 104
EXT SW PCB
EXT IN, FLB 1, 2, 3, 4 ch
EXT IN, FLB 5, 6, 7, 8 ch
IN/OUTPUT (A) PCB - 138 (2 Ass'y)
MIC IN
INPUT AMPL. PCB (F Ass'y)
INPUT AMPL. PCB (G Ass'y)
SW (A) PCB-211
INPUT FADER 9
INPUT FADER 10
INPUT FADER 11
INPUT FADER 12
SW (B) PCB - 212
METER AMPL. PCB - 120 (1, 2ch)
METER AMPL. PCB - 120 (3, 4ch)
METER AMPL. PCB - 120 (5, 6ch)
METER AMPL. PCB - 120 (7, 8ch)
AUX 4
AUX 3
AUX 2
AUX 1
BUSS 7
BUSS 5
BUSS 3
BUSS 1
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
+15V
-15V
11V AC
0V
+6V
0V(D)
LINE IN
ACCESS SEND
ACCESS RCV
DIRECT OUT
TAPE OUT
PHANTOM
+48V
9ch.
10 ch.
11ch.
12ch.

4-18. Wiring Diagram-1 [M-520]


1
2
3
4
5
6
A
B
C
D
E
F
G
MOTHER (A) PCB (1/2)
P18
P19
MOTHER (B) PCB (1/2)
INST 1
INST VR 1
INST 2
INST VR 2
P31
P30
P34
P33
P32
P35
P1
P2
P3
P4
P37
P36
INST IN
GND
IN/OUTPUT (A) PCB-138 (1 Ass'y)
IN/OUTPUT (A) PCB-138 (2 Ass'y)
MIC IN
MIC
INST
TAPE
PHONO
ACCESS
P4 (RED)
D. OUT
SEND
RCV
PHANTOM +48V
INPUT AMPL. PCB (A Ass'y)
INPUT AMPL. PCB (B Ass'y)
INPUT AMPL. PCB (C Ass'y)
INPUT AMPL. PCB (D Ass'y)
TAPE IN
LINE IN
DIRECT OUT
TAPE OUT
INST VR
AUX 4
AUX 3
AUX 2
AUX 1
SW (A) PCB-211
INPUT FADER 1
INPUT FADER 2
INPUT FADER 3
INPUT FADER 4
P7
+6V
OV (D)
-15V
+15V
OV (C)
BUSS 7
BUSS 5
BUSS 3
BUSS 1
P6
P5
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
SW (B) PCB-212
1 ch
2 ch
3 ch
4 ch
5, 9, 13 ch
(5~8 ch), (9~12ch), (13~16ch)

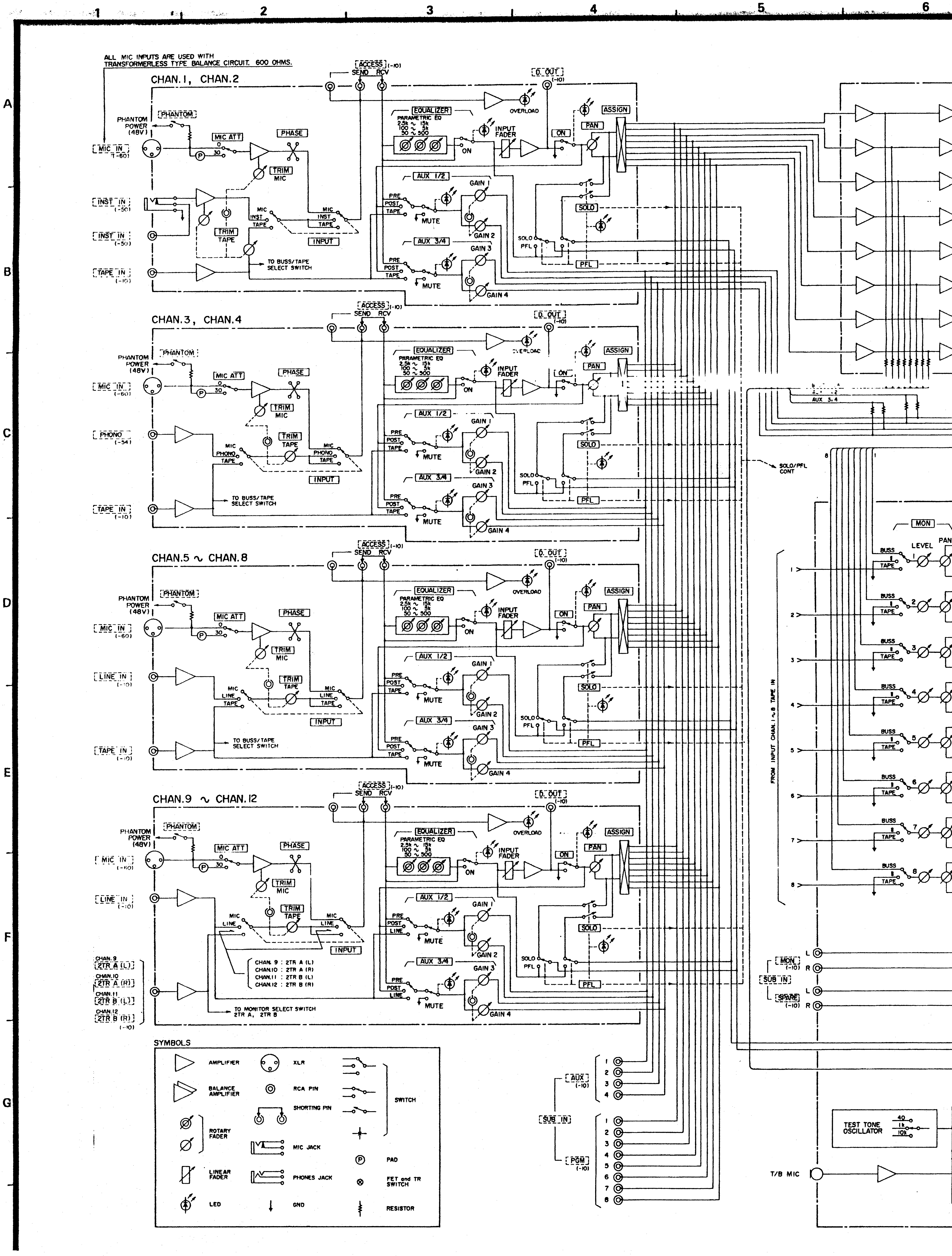

5
6
7
8
9
IN/OUTPUT (A)
PCB-138 (2 Ass'y)
MIC IN
INPUT AMPL.
PCB (C Ass'y)
PCB (D Ass'y)
SW (A)
PCB-211
INPUT FADER
SW (B)
PCB-212
4 ch
5, 9, 13 ch
(5∼8 ch), (9∼12 ch), (13∼16 ch)
6, 10, 14 ch
7, 11, 15 ch
8, 12, 16 ch

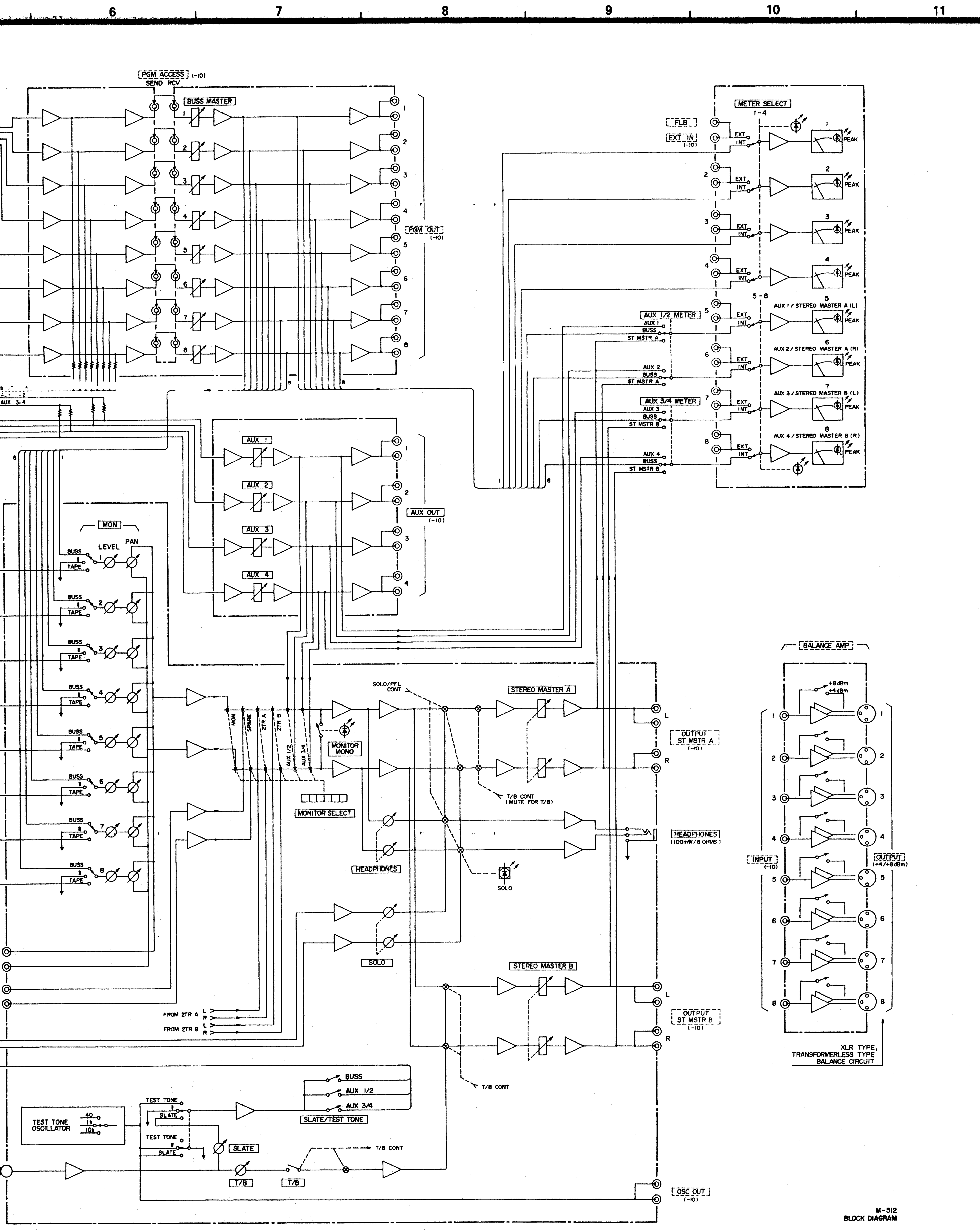

7
8
9
10
11
12
IN/OUTPUT (A)
PCB-138 (2 Ass'y)
MIC IN
INPUT AMPL.
PCB
SW (A)
PCB-211
INPUT FADER 7, 11, 15
INPUT FADER 8, 12, 16
INPUT FADER 18
INPUT FADER 19
INPUT FADER 20
SW (B)
PCB-212
7, 11, 15 ch
8, 12, 16 ch
17 ch
18 ch
19 ch
20 ch
P2
P3
P4 (RED)
D.OUT 1
SEND 2
RCV 3
ACCESS
P1
PHANTOM +48V
LINE IN
ZTR A(L)
DIRECT OUT
AUX 4
AUX 3
AUX 2
AUX 1
+6V
0V (D)
-15V
+15V
0V (C)
BUSS 7
BUSS 5
BUSS 3
BUSS 1
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
17 ~ 20 ch
PHANTOM (+48V)
AUX 1/ ST MSTR A
AUX 2/ ST MSTR A
AUX 3/ ST MSTR B
AUX 4/ ST MSTR B


10
11
12
13
14
EXT SW PCB
JACK PCB-104
EXT IN, FLB 1, 2, 3, 4 ch
JACK PCB-104
EXT IN, FLB 5, 6, 7, 8 ch
EXT LED PCB
1-4
5-8
IN/OUTPUT (A) PCB-138 (2 Ass'y)
MIC IN
INPUT AMPL. PCB (F Ass'y)
INPUT AMPL. PCB (G Ass'y)
SW (A) PCB-211
INPUT FADER 18
INPUT FADER 19
INPUT FADER 20
SW (B) PCB-212
17 ch
18 ch
19 ch
20 ch
METER AMPL. PCB-120 (1, 2 ch)
METER AMPL. PCB-120 (3, 4 ch)
METER AMPL. PCB-120 (5, 6 ch)
METER AMPL. PCB-120 (7, 8 ch)
METER AMPL. PCB-120 (AUX 1, 2/ST MSTR A L, R)
METER AMPL. PCB-120 (AUX 3, 4/ST MSTR B L, R)
AUX 1/ST MSTR A L
AUX 2/ST MSTR A R
AUX 3/ST MSTR B L
AUX 4/ST MSTR B R
AUX 4
AUX 3
AUX 2
AUX 1
+5V
0V (D)
-15V
+15V
0V (C)
BUSS 7
BUSS 5
BUSS 3
BUSS 1
SOLO/PFL CONT
SOLO/PFL R
SOLO/PFL L
BUSS 8
BUSS 6
BUSS 4
BUSS 2
17 ~ 20 ch

M-520
WIRING DIAGRAM (1/2)

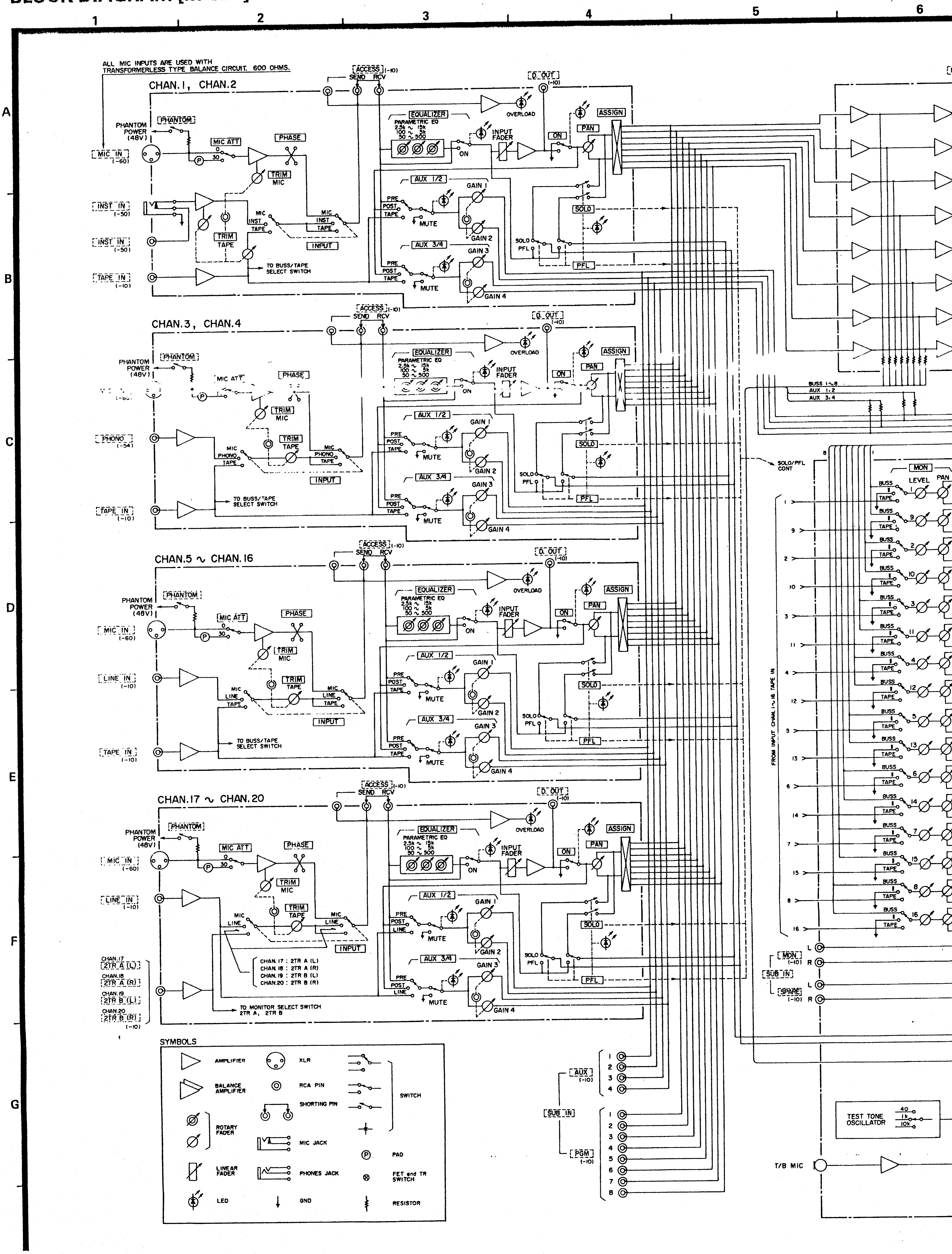
BLOCK DIAGRAM [M-512]


1
2
3
4
5
6
A
B
C
D
E
F
G
ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.8
CHAN.9 ~ CHAN.12
ACCESS (-10)
SEND
RCV
D. OUT (-10)
OVERLOAD
PHANTOM POWER (48V)
PHANTOM
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
MIC IN (-60)
INST IN (-50)
TAPE IN (-10)
PHONO (-54)
LINE IN (-10)
INPUT
TO BUSS/TAPE SELECT SWITCH
EQUALIZER
PARAMETRIC EQ
2.5k ~ 15k
100 ~ 5k
50 ~ 500
INPUT FADER
ON
ASSIGN
PAN
AUX 1/2
AUX 3/4
PRE
POST
TAPE
LINE
MUTE
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
CHAN. 9 : 2TR A (L)
CHAN.10 : 2TR A (R)
CHAN.11 : 2TR B (L)
CHAN.12 : 2TR B (R)
CHAN. 9 2TR A (L)
CHAN.10 2TR A (R)
CHAN.11 2TR B (L)
CHAN.12 2TR B (R)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
SOLO/PFL CONT
AUX 3, 4
FROM INPUT CHAN. 1 ~ 8 TAPE IN
MON
LEVEL
PAN
BUSS
TAPE
MON (-10)
SUB IN
SPARE (-10)
L
R
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
T/B MIC
SYMBOLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
XLR
RCA PIN
SHORTING PIN
MIC JACK
PHONES JACK
GND
SWITCH
PAD
FET and TR SWITCH
RESISTOR

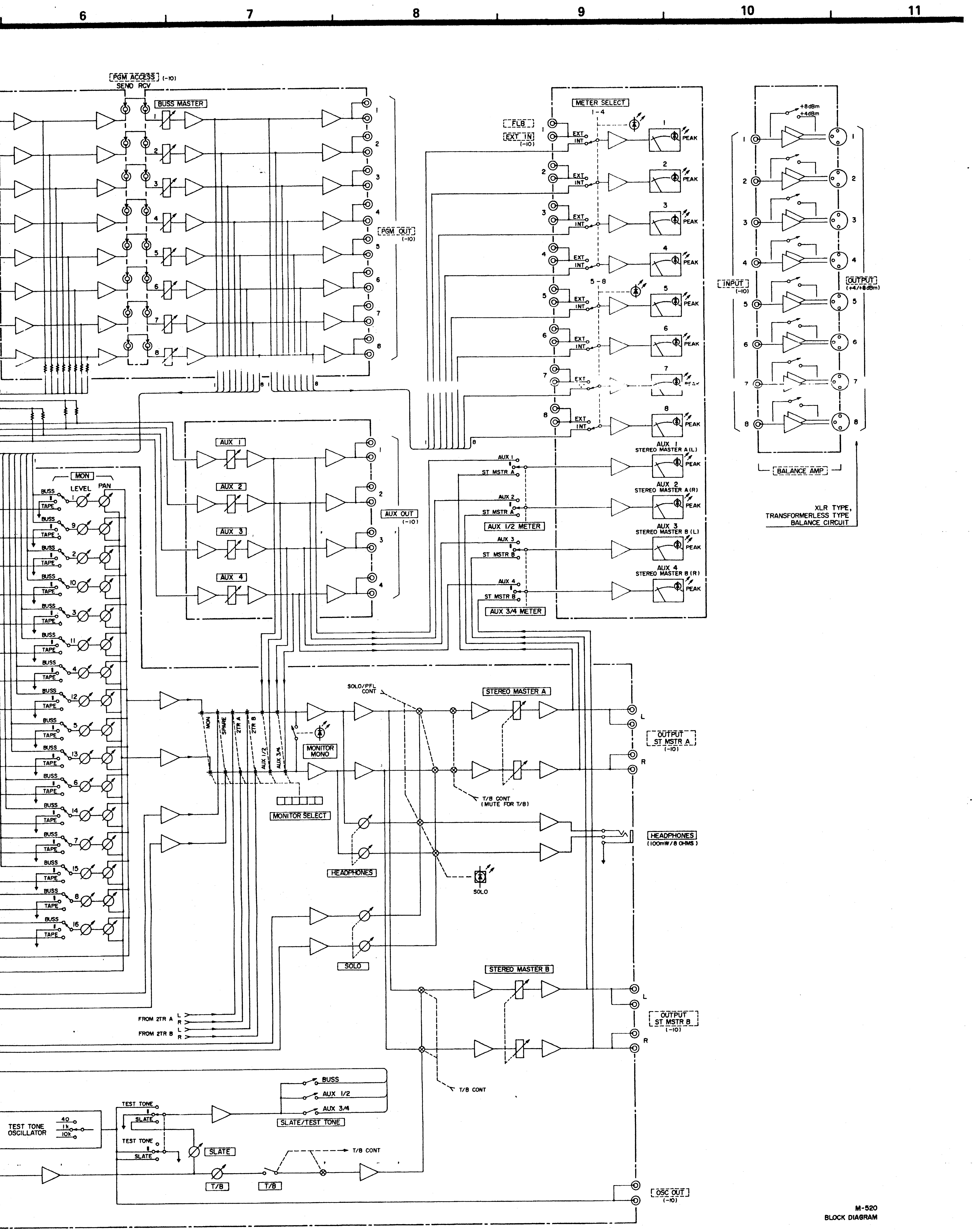

6
7
8
9
10
11
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
1
2
3
4
5
6
7
8
PGM OUT (-10)
METER SELECT
1-4
FLB
EXT IN (-10)
EXT
INT
PEAK
5-8
AUX 1 / STEREO MASTER A (L)
AUX 2 / STEREO MASTER A (R)
AUX 3 / STEREO MASTER B (L)
AUX 4 / STEREO MASTER B (R)
AUX 1/2 METER
AUX 1
BUSS
ST MSTR A
AUX 2
AUX 3/4 METER
AUX 3
ST MSTR B
AUX 4
AUX 3, 4
AUX 1
AUX 2
AUX 3
AUX 4
AUX OUT (-10)
MON
LEVEL
PAN
BUSS
TAPE
SOLO/PFL CONT
STEREO MASTER A
MON
SPARE
2TR A
2TR B
AUX 1/2
AUX 3/4
MONITOR MONO
MONITOR SELECT
OUTPUT ST MSTR A (-10)
L
R
T/B CONT (MUTE FOR T/B)
HEADPHONES (100mW / 8 OHMS)
HEADPHONES
SOLO
SOLO
STEREO MASTER B
OUTPUT ST MSTR B (-10)
FROM 2TR A
FROM 2TR B
T/B CONT
BUSS
AUX 1/2
AUX 3/4
SLATE/TEST TONE
TEST TONE
SLATE
TEST TONE OSCILLATOR
40
1k
10k
SLATE
T/B CONT
T/B
T/B
OSC OUT (-10)
BALANCE AMP
+8dBm
+4dBm
INPUT (-10)
OUTPUT (+4/+8dBm)
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT

M-512
BLOCK DIAGRAM

BLOCK DIAGRAM [M-520]



1
2
3
4
5
6
A
B
C
D
E
F
G
ALL MIC INPUTS ARE USED WITH TRANSFORMERLESS TYPE BALANCE CIRCUIT. 600 OHMS.
CHAN.1, CHAN.2
CHAN.3, CHAN.4
CHAN.5 ~ CHAN.16
CHAN.17 ~ CHAN.20
ACCESS (-10)
SEND RCV
D. OUT (-10)
OVERLOAD
PHANTOM POWER (48V)
PHANTOM
MIC ATT
PHASE
TRIM MIC
TRIM TAPE
MIC IN (-60)
INST IN (-50)
TAPE IN (-10)
PHONO (-54)
LINE IN (-10)
MIC INST TAPE
MIC PHONO TAPE
MIC LINE TAPE
INPUT
TO BUSS/TAPE SELECT SWITCH
EQUALIZER
PARAMETRIC EQ
2.5k ~ 15k
100 ~ 5k
50 ~ 500
ON
INPUT FADER
ASSIGN
PAN
AUX 1/2
AUX 3/4
PRE POST TAPE
PRE POST LINE
MUTE
GAIN 1
GAIN 2
GAIN 3
GAIN 4
SOLO
PFL
CHAN.17 : 2TR A (L)
CHAN.18 : 2TR A (R)
CHAN.19 : 2TR B (L)
CHAN.20 : 2TR B (R)
CHAN.17 2TR A (L)
CHAN.18 2TR A (R)
CHAN.19 2TR B (L)
CHAN.20 2TR B (R) (-10)
TO MONITOR SELECT SWITCH 2TR A, 2TR B
BUSS 1~8
AUX 1, 2
AUX 3, 4
SOLO/PFL CONT
FROM INPUT CHAN. 1~16 TAPE IN
MON
LEVEL
PAN
BUSS
TAPE
1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16
MON (-10)
SUB IN
SPARE (-10)
L R
AUX (-10)
SUB IN
PGM (-10)
TEST TONE OSCILLATOR
40
1k
10k
T/B MIC
SYMBOLS
AMPLIFIER
BALANCE AMPLIFIER
ROTARY FADER
LINEAR FADER
LED
XLR
RCA PIN
SHORTING PIN
MIC JACK
PHONES JACK
GND
SWITCH
PAD
FET and TR SWITCH
RESISTOR


6
7
8
9
10
11
PGM ACCESS (-10)
SEND RCV
BUSS MASTER
1
2
3
4
5
6
7
8
PGM OUT (-10)
METER SELECT
1-4
5-8
FLB
EXT IN (-10)
EXT
INT
PEAK
AUX 1 STEREO MASTER A (L)
AUX 2 STEREO MASTER A (R)
AUX 3 STEREO MASTER B (L)
AUX 4 STEREO MASTER B (R)
AUX 1
AUX 2
AUX 3
AUX 4
ST MSTR A
ST MSTR B
AUX 1/2 METER
AUX 3/4 METER
+8dBm
+4dBm
INPUT (-10)
OUTPUT (+4/+8dBm)
BALANCE AMP
XLR TYPE, TRANSFORMERLESS TYPE BALANCE CIRCUIT
AUX OUT (-10)
MON
LEVEL
PAN
BUSS
TAPE
9
10
11
12
13
14
15
16
SOLO/PFL CONT
STEREO MASTER A
MON
SPARE
2TR A
2TR B
AUX 1/2
AUX 3/4
MONITOR MONO
MONITOR SELECT
T/B CONT (MUTE FOR T/B)
OUTPUT ST MSTR A (-10)
L
R
HEADPHONES (100mW/8 OHMS)
HEADPHONES
SOLO
STEREO MASTER B
FROM 2TR A
FROM 2TR B
OUTPUT ST MSTR B (-10)
T/B CONT
BUSS
AUX 1/2
AUX 3/4
SLATE/TEST TONE
TEST TONE
SLATE
TEST TONE OSCILLATOR
40
1k
10k
T/B
OSC OUT (-10)

M-520
BLOCK DIAGRAM

TASCAM
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M-512/M-520

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